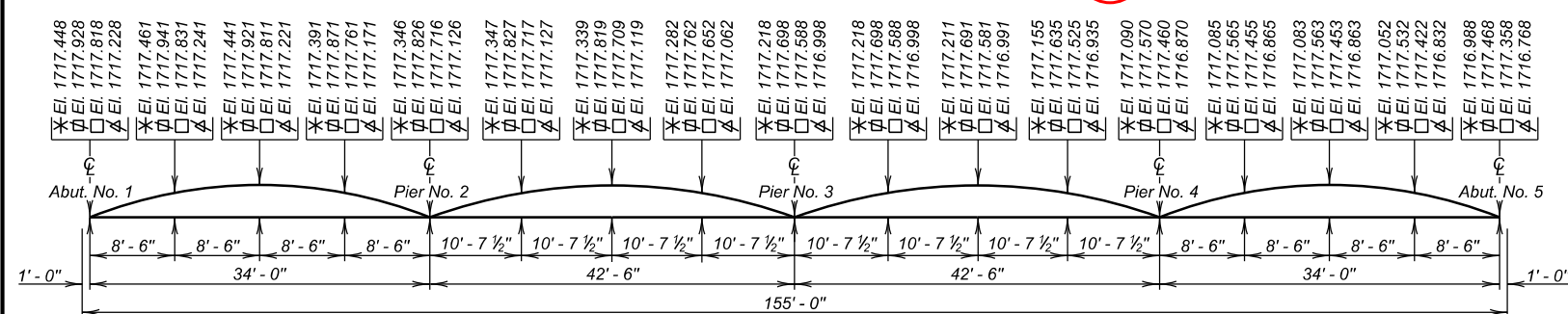
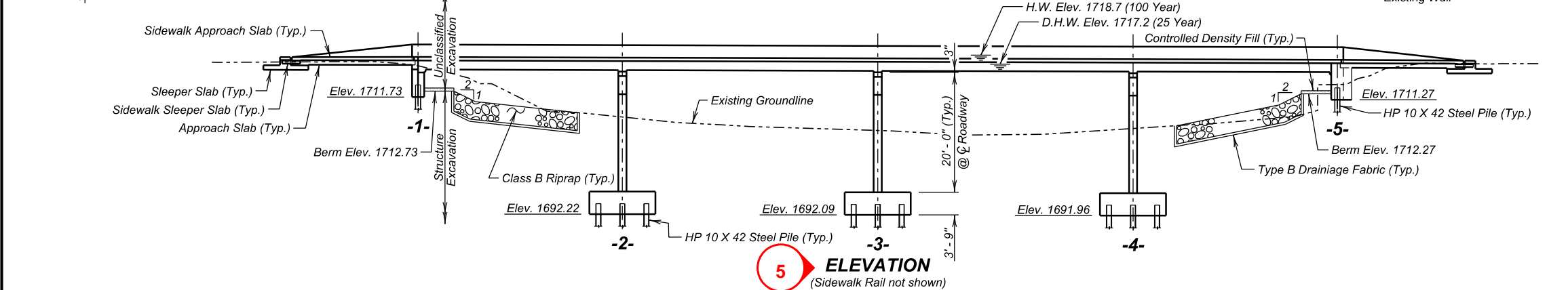


NOTES:
T.S. at L.C. El. = Top of Slab at Left Curb Elevation
T.S. at C El. = Top of Slab at Centerline Elevation
T.S. at R.C. El. = Top of Slab at Right Curb Elevation



Elevations with a ✕ are Top of Finished Slab at Left Curb. Elevations with a ∅ are Top of Finished Slab at Crown Point. Elevations with a □ are Top of Finished Slab at C Roadway. Elevations with a ∄ are Top of Finished Slab at Right Curb.

Diagram illustrating a bridge structure with a 21 1/2" thick concrete slab. The bridge is supported by two piers. The left pier is at Station 18 + 50.00, and the right pier is at Station 26 + 05.00. The bridge deck is at Station 23 + 41.80. The bridge is labeled "Begin Bridge" and "End Bridge". The bridge is supported by two piers. The left pier is at Station 18 + 50.00, and the right pier is at Station 26 + 05.00. The bridge deck is at Station 23 + 41.80. The bridge is labeled "Begin Bridge" and "End Bridge".

PLANS BY:
OFFICE OF BRIDGE DESIGN, SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

**-X020-
INDEX OF BRIDGE SHEETS -**

Sheet No. 1 - General Drawing
Sheet No. 2 - Estimate of Structure Quantities & Notes
Sheet No. 3 - Notes (Continued)
Sheet No. 4 - Notes (Continued)
Sheet No. 5 - Subsurface Investigation & Piling Layout
Sheet No. 6 - Piling Layout Details
Sheet No. 7 - Abutment No. 1 Details (A)
Sheet No. 8 - Abutment No. 1 Details (B)
Sheet No. 9 - Abutment No. 5 Details (A)
Sheet No. 10 - Abutment No. 5 Details (B)

① Title Block	⑦ Hydraulic Data
② Project Block	⑧ Curb & ℓ Elevations
③ Index of Sheets	⑨ Survey Datum Box
④ Plan View	⑩ Design Firm or Office
⑤ Elevation View	⑪ North Arrow
⑥ Horiz. & Vert. Curve Data	

Sheet No. 25 - Tapered Barrier Details (A)
Sheet No. 26 - Tapered Barrier Details (B)
Sheet No. 27 - Sidewalk Approach Slab Details
Sheet No. 28 - Approach Slab Joint Details
Sheet No. 29 - Riprap Details
Sheet No. 30 - Standard Plate No.'s 460.02 and 460.05
Sheet No. 31 - Standard Plate No.'s 510.40 and 620.18

Q_d	2949 cfs
A_d	983 sq. ft.
V_d	3.0 fps
Q_F	2949 cfs
Q_{100}	5687 cfs
Q_{OT}	3025 cfs
V_{max}	5.9 fps

Q_{OT} = Overtopping discharge and frequency 27 year recurrence interval. El. 1717.3. Approximately 100' east of the structure \mathcal{C} . The upstream levee system is assumed to contain flows to an elevation of 1718.4 until the levee intersects US212 crossing and overtops at elevation 1717.3 at the location listed.

◆ *Topeka Shiner Stream*

59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
 ♠ OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
 STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
 STR. NO. 15-181-180 HL-93
 PCN 027Q

S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2017

-X020-

DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY MG	<i>Steve A. Johnson</i> BRIDGE ENGINEER
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ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Concrete Penetrating Sealer	1,016	SqYd	See Special Provision
Incidental Work, Structure	Lump Sum	LS	
Membrane Sealant Expansion Joint	146.7	Ft	
Structure Excavation, Bridge	1308	CuYd	
Bridge End Embankment	357	CuYd	
Granular Bridge End Backfill	113.8	CuYd	
Approach Slab Underdrain Excavation	5.3	CuYd	
Class A45 Concrete, Bridge Deck	599.3	CuYd	
Class A45 Concrete, Bridge	434.3	CuYd	
Concrete Approach Slab for Bridge	277.7	SqYd	
Concrete Approach Sleeper Slab for Bridge	97.3	SqYd	
Deck Drain, Slab Bridge	8	Each	
Controlled Density Fill	12.9	CuYd	
Steel Pedestrian Railing on Sidewalk	391.0	Ft	
Steel Pedestrian Railing on Concrete Barrier	308.0	Ft	
Reinforcing Steel	82,277	Lb	
Epoxy Coated Reinforcing Steel	155,278	Lb	
Extract Pile	81	Each	
Preboring Pile	160	Ft	
HP 10x42 Steel Test Pile, Furnish and Drive	490	Ft	
HP 10x42 Steel Bearing Pile, Furnish and Drive	10,140	Ft	
4" Rigid Galvanized Steel Conduit	310	Ft	
6" Reinforced Concrete Sidewalk	544	SqFt	
4" Underdrain Pipe	437	Ft	
Porous Backfill	47.8	Ton	
Class B Riprap	970.1	Ton	
Type B Drainage Fabric	928	SqYd	

SPECIFICATIONS FOR BRIDGE

- Design Specifications: AASHTO LRFD Bridge Design Specifications, 2017 Edition.
- Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required provisions, supplemental specifications, and special provisions as included in the proposal.

BRIDGE DESIGN LOADING

- AASHTO HL-93.
- Dead Load includes 22 psf for future wearing surface on the roadway.

DESIGN MATERIAL STRENGTHS

Concrete

Reinforcing Steel

Piling (ASTM A572 Grade 50)

f'c = 4,500 psi

fy = 60,000 psi

fy = 50,000 psi

GENERAL CONSTRUCTION

- All mild reinforcing steel shall conform to ASTM A615, Grade 60.
- All exposed concrete corners and edges shall be chamfered 3/4" unless noted otherwise.
- Use 2" clear cover on all reinforcing steel except as shown.
- Contractor shall imprint on the structure the date of new construction as specified and detailed on Standard Plate No. 460.02.
- Barrier Curbs shall be built normal to the grade.
- Request for construction joints or re-steel splices at points other than those shown, must be submitted to the Engineer for prior approval. If additional splices are approved, no payment will be allowed for the added quantity of re-steel.
- The elevation of the bridge deck is 21.5" above subgrade elevation.

INCIDENTAL WORK, STRUCTURE

- In place centerline Sta. 23+50.80 to centerline Sta. 24+96.80 is a 146.0' 4 span continuous concrete slab bridge with a 54'-0" clear roadway. The superstructure consists of a reinforced concrete slab with concrete barrier curb continuous across the bridge and 5'-8" cantilever sidewalk with steel railing on both sides of the bridge. The deck includes a 2 inch low slump dense concrete overlay and a single layer epoxy chip seal overlay. The substructure consists of reinforced concrete pier walls and reinforced concrete vertical abutments, all of which are supported on timber piling. The east abutment includes sheet pile in front of the berm and a portion of the wingwall of the adjacent dam. A 26 1/2" sanitary sewer pipe is located approximately 27 feet north of the roadway centerline. The pipe is to be relocated by the City of Watertown.
- Break down and remove the existing bridge, and approach/sleeper slabs if applicable, to 1 foot below finished groundline, or as required to construct the new structure in accordance with Section 110 of the Specifications. All portions of the existing bridge shall be removed and disposed of by the Contractor on a site obtained by the Contractor and approved by the Engineer in accordance with the Environmental Commitments found in Section A. A portion of the wingwall of the adjacent dam shall be removed to construct Abutment No. 5. See Abutment No. 5 Details (A).
- During demolition of the structure, efforts shall be taken to prevent material from falling into the river. Under no circumstances is asphalt allowed to fall into the river.
- The foregoing is a general description of the in-place bridge and should not be construed to be complete in all details. Before preparing the bid it shall be the responsibility of the Contractor to make a visual inspection of the structure to verify the extent of the work and materials involved. If desired by the Contractor, a copy of the original construction plans may be obtained through the Office of Bridge Design.

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			

- It is anticipated that at least 81 timber piles will interfere with piling for this new structure. Any existing pile that interferes with piling for the new structure shall be extracted. Payment for the extracting piling shall be contract unit price per each for Extract Pile and shall be full compensation for extracting piling including materials, labor, and equipment necessary or incidental to the satisfactory completion of this work.

DESIGN MIX OF CONCRETE

- All structural concrete shall be Class A45 unless otherwise indicated.
- Type II cement is required.

ABUTMENTS

- Pre-boring piling at each abutment is required to whichever is greater, ten feet or to natural ground
- The HP 10x42 Piling were designed using a factored bearing resistance of 77 tons per pile. Piling shall develop a field verified nominal bearing resistance of 192 tons per pile.
- The contractor shall have sufficient pile splice material on hand before pile driving is started. See Standard Plate No. 510.40.
- Piles shall not be driven out of position by more than three inches in the direction normal to the abutment centerline. A pile-driving template shall be used to ensure this accuracy.
- One test pile shall be driven at each abutment and will become part of the pile group.
- Each finished abutment shall include a Bridge Survey Marker. See Standard Plate No. 460.05.

REQUIRED LIST

- 1
- Title Block
- 2
- Project Block
- 3
- Estimate of Quantities
- 4
- Notes

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES
FOR
155' - 0" CONT. CONCRETE BRIDGE

STR. NO. 15-181-180
SEPTEMBER 2017

DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY PW	 BRIDGE ENGINEER
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3

PILE DRIVING

1. A drivability analysis was performed using the wave equation analysis program (GRLWEAP). The following pile hammers were evaluated and found to produce acceptable driving stresses:

Delmag D25-32Delmag D30-32

SPI D30APE D30-52

2. Pile hammers not listed will require evaluation and approval prior to use from the Geotechnical Engineering Activity.

PIERS

1. The HP 10x42 Piling were designed using a factored bearing resistance of 77 tons per pile. Piling shall develop a field verified nominal bearing resistance of 192 tons per pile.
2. One test pile shall be driven at each bent and will become part of the pile group.
3. The contractor shall have sufficient pile splice material on hand before pile driving is started. See Plate No. 510.40
4. It is anticipated that cofferdams and foundation seals will be necessary. Cofferdams and foundation seals shall be designed and constructed in accordance with Section 423 of the Specifications. Contact the Office of Bridge Design if additional piles are required.
5. Galvanize the pier wall armoring plates and anything welded to them after all welding is completed. They shall be galvanized in accordance with AASHTO M111 (ASTM A123). If welded splices are used subsequent to galvanizing, the weld details and the procedures for preparing the surface for welding and repairing the galvanizing after welding shall be included with the shop plans. Repair of galvanizing shall be by zinc-based solder method in conformance with ASTM A780.
6. Steel for the pier wall armoring plates shall be ½” thickness and conform to ASTM A709, Grade 36. Shear connectors shall conform to Clause 7.3, Type A or b of the AASHTO/AWS D1.5 Bridge Welding Code.
7. Welding for the pier wall armoring plates shall be in accordance with AWS D1.1 Structural Welding Code – Steel.
8. The cost of the pier wall armoring plates complete and in-place including fabrication, welding, and galvanizing shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge.

SUPERSTRUCTURE

1. Preplanned construction joints may be used in accordance with Section 460.3 of the Specifications. Contact the Office of Bridge Design for joint configuration and allowable location. Emergency slab construction joints shall be as shown with the superstructure details. If an emergency slab joint is used, contact the Office of Bridge Design before proceeding with deck pour.

2. The deck-finishing machine shall be adjusted and operated in such a manner that the roller screed or screeds are parallel with the centerline of the bridge and the finish machine is parallel to the skew of the bridge. Concrete placement in front of the finish machine shall be kept parallel to the machine.
3. Barrier curbs shall be poured after all the slab has been poured. Superstructure falsework shall not be removed until bridge deck concrete, including barrier curbs, has attained a strength of 2400 psi.
4. The bridge deck must be placed and finished continuously at a minimum rate of 22 ft. of deck per hour measured along centerline roadway. If concrete cannot be placed and finished at this rate, the Engineer shall order a header installed and operations stopped. Notify the Bridge Construction Engineer if deck pour operations are stopped. Operations may resume only when the Engineer is satisfied that a minimum rate of 22 ft. of deck per hour can be achieved and the concrete in the previous pour has attained a minimum compressive strength of 2000 psi.
5. Snap ties, if used in barrier curb formwork, shall be epoxy coated. The epoxy coating shall be inert in concrete and compatible with the coating applied to the new epoxy coated reinforcing steel.

CLASS A45 CONCRETE, BRIDGE DECK

1. Concrete used in the bridge deck slab and barrier curbs shall be in accordance with the requirements for bridge deck concrete as specified in Section 460.3 A of the Specifications.
2. See Special Provision for Concrete Penetrating Sealer.

CLASS B COMMERCIAL TEXTURE FINISH

1. A Class B commercial texture finish shall be applied to the following areas:
- a) ***Abutments:** all exposed surfaces to an elevation 1-foot below finished ground line.

b) **Barrier Rail:** all exposed surfaces (**front, **top and *back).

c) ***Slab:** edge of slab.

d) ***Piers:** all exposed surfaces.
- *Color shall be an approved tan.

**Color shall be “Pearl White.”
2. The Class B commercial texture finish shall be applied in accordance with Section 460.3 L.1.c of the Specifications.
3. Where the Class B commercial texture finish is to be applied, concrete curing shall be accomplished with cotton or burlap mats and polyethylene sheeting. Curing shall continue for not less than seven days after placing concrete before the commercial texture finish is applied. The commercial texture finish shall be applied in accordance with the manufacturer's recommendations. The commercial texture finish itself does not require a specific cure except for drying.

APPROACH SLABS

1. Sleeper slab riser shall be cast with the approach slab or cast after the approach slab is placed. Care shall be taken to ensure the correct grade is maintained across the joint.
2. The portion of the sleeper slab below the construction joint may be precast. If the bottom portion of the sleeper slab is precast, the Contractor shall submit proposed lifting and setting plans to the Bridge Construction Engineer for approval. In addition, if reinforcing or other details differ from those shown in the plans, the Contractor shall submit proposed alternate details for approval.
3. The use of an approved finishing machine will be required during placement of Class A45 Concrete for the approach slabs. Concrete placement in front of the machine shall be kept parallel to the screed.
4. The concrete in the approach slab shall be tined normal to centerline roadway.
5. Concrete Approach Sleeper Slab for Bridge, whether cast-in-place or precast, will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling, and placing all materials including concrete and reinforcing steel; for disposal of all excavated material and surplus materials; and for labor, tools, equipment and any incidentals necessary to complete this item of work.
6. Concrete Approach Slab for Bridge will be paid for at the contract unit price per square yard. This payment shall be full compensation for all excavation, furnishing, hauling and placing all materials including concrete, asphalt paint or 6 mil polyethylene sheeting, elastic joint sealer and reinforcing steel; for disposal of all excavated material and surplus materials and for labor, tools, equipment and any incidentals necessary to complete this item of work.

REQUIRED LIST

1

Title Block

2

Project Block

3

Notes

1

NOTES (CONTINUED)

FOR

155' - 0" CONT. CONCRETE BRIDGE

STR. NO. 15-181-180

SEPTEMBER 2017

3

DECK DRAINS

- Deck Drains shall be 4" diameter by 1' – 6 ½" Schedule 40 Polyvinyl Chloride (PVC) Plastic Pipe conforming to the requirements of ASTM D1785.
- A 4 1/2 inch diameter by 2 inch PVC Plastic Pipe Sleeve conforming to the requirements of ASTM D1785 shall be attached to the 4" diameter PVC Pipe, as shown in the plans, with a solvent cement conforming to ASTM D2564.
- Payment for Deck Drains shall be at the contract unit price per each for Deck Drain, Slab Bridge, and shall be full compensation for furnishing, fabricating and installing the deck drains in accordance with the Plans and Specifications.
- The location of the deck drains may be adjusted slightly to clear transverse slab steel.

STEEL RAILING – SIDEWALK

- All rail posts shall be built vertical.
- All structural steel parts for railing shall conform to ASTM A500, Grade B. Material less than ¼" thick may be ASTM A1011, Grade 36. Rail post base plates shall conform to ASTM A709, Grade 36.
- All anchor bolts and nuts for railing shall conform to ASTM A307. Washers shall conform to ASTM F436 and all components shall be galvanized in accordance with ASTM A153 or ASTM F2329, as applicable. The bolts shall be hex head "structural" type with heavy hex nuts and round washers.
- All anchor bolts shall be tightened to a torque of 120 ft.-lbs. (approximated without the use of a calibrated torque wrench).
- The non-shrink grout used to fill the recess beneath the rail post base plates shall be a commercially available non-shrink grout containing no metallic particles and capable of attaining a 28 day compressive strength of 3000 psi. The non-shrink grout shall be mixed according to the manufacturer's recommendations. The cost of furnishing and placing the non-shrink grout shall be incidental to the contract unit price per foot for Steel Pedestrian Railing on Sidewalk.
- All steel railing shall be galvanized after shop welding in accordance with ASRM A123 and shall be painted in accordance with Section 411 of the Specifications and the color shall be an approved black (Federal Standard 595B Color 27038). The galvanized steel railing shall be cleaned in accordance with ASTM D6386 before painting.
- Welding & Weld Inspection shall be done in accordance with the current edition of AWS D1.1 Structural Welding Code-Steel.
- The costs of structural steel, welding, weld inspection, painting and galvanizing shall be incidental to the contract unit price per foot for Steel Pedestrian Railing on Sidewalk and Steel Pedestrian Railing on Concrete Barrier.

SIDEWALK APPROACH SLABS

- The reinforced concrete sidewalks adjacent to the bridge shall be paid for at the contract unit price per square foot for 6" Reinforced Concrete Sidewalk. This payment will be full compensation for all excavation, furnishing, hauling and placing all materials including concrete, epoxy coated reinforcing steel, asphalt paint or 4 mil polyethylene sheeting, hot poured elastic joint sealer; for disposal of all excavated and surplus materials; and for all labor, tools, equipment and incidentals necessary to complete this item of work.
- The top of the sidewalk shall transition from the end of the bridge to the top of approach slab curb at the sidewalk expansion device.
- All costs involved in furnishing and placing the sidewalk sleeper slabs shall be included in the contract unit price per square foot for 6" Reinforced Concrete Sidewalk.

NOTICE - LEAD BASED PAINT

Be advised that the paint on the steel surfaces of the existing structure contains lead. The Contractor should plan his/her operations accordingly, and inform his/her employees of the hazards of lead exposure.

4" RIGID GALVANIZED STEEL CONDUIT

- The ¼" diameter concrete inserts for conduit clamps shall be commercially available inserts threaded for use with a galvanized ¼" diameter A307 bolt. The insets shall be capable of developing the strength of A307 bolt and shall be galvanized or stainless steel. The cost of furnishing and installing the inserts shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge Deck.
- The cost for furnishing and installing the 5" sleeves and polyethylene sheeting shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge.

REQUIRED LIST

- 1
- Title Block
- 2
- Project Block
- 3
- Notes

1

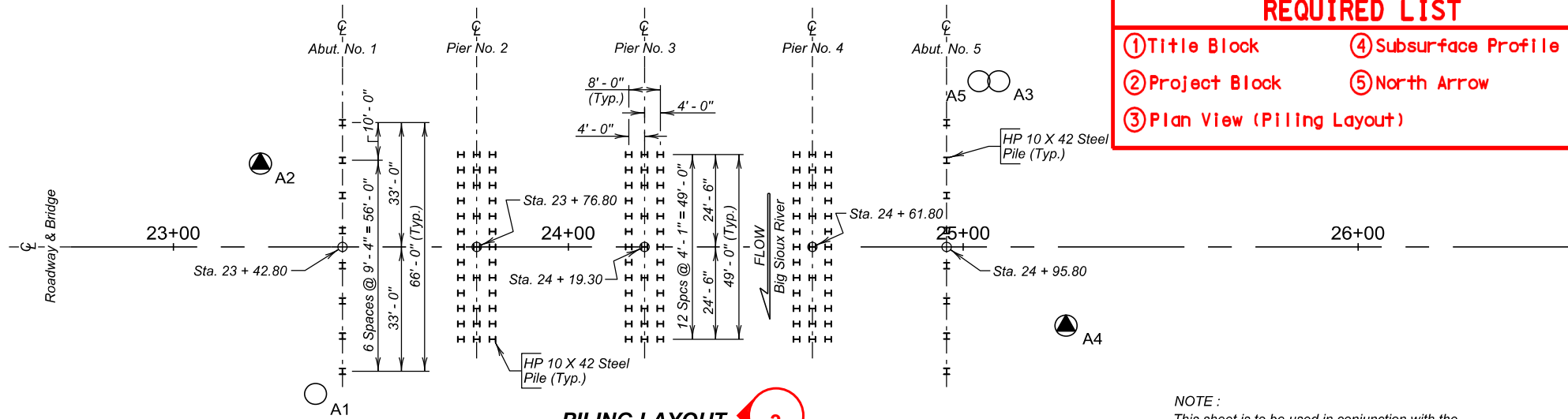
NOTES (CONTINUED)

FOR
155' - 0" CONT. CONCRETE BRIDGE

STR. NO. 15-181-180
SEPTEMBER 2017



5



PILING LAYOUT

3

NOTE :
This sheet is to be used in conjunction with the
PILING LAYOUT DETAILS sheet.

REQUIRED LIST

- 1 Title Block
- 2 Project Block
- 3 Plan View (Piling Layout)
- 4 Subsurface Profile
- 5 North Arrow

2

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			

Glaciated Terrain contains all sizes of natural mineral sediment ranging from clay to boulders. Streams originating in or flowing through glaciated topography contain sediment loads derived from glaciated sources. Stream and river crossings contain sediment naturally sorted and randomly concentrated. Alluvial sediment located at this project location may have concentrated coarser gravel such as pebbles, cobbles and boulders. The borings shown only represent material that was found at the exact location of the small diameter drill hole. Coarse granular material may be present in areas not penetrated by the depicted borings.

The Geotechnical Engineering Activity has all of the boring logs and laboratory test results available for review at the Central Office in Pierre.

LEGEND

- Penetration Test
- ⊖ Drive Test
- ▽ Water
- ⊖ Caved
- ▬ Sample Zone

Drive tests are conducted by dropping a 490 pound hammer 30 inches to drive a 2 7/8 inch drill stem to measure the resistance to penetration of the soil.

Penetration test holes are drilled with a 6 5/8 inch diameter hollow stem auger. Penetration tests are conducted by dropping a 140 pound hammer 30 inches to obtain 2 inch nominal diameter samples and to measure the resistance to penetration of the soil. Penetration Test results are listed as uncorrected "N" values in blows per foot.

GROUNDWATER ELEVATIONS

JULY 2017

A1	1709.6
A2	(DRY) 1710.0
A3	1709.7
A4	(DRY) 1709.8
A5	1709.7

MEASURED SKIN FRICTION

	ELEV.	PSF
A2	1661.8	497
A2	1627.8	728
A4	1630.6	474

1

SUBSURFACE INVESTIGATION & PILING LAYOUT FOR

155' - 0" CONT. CONCRETE BRIDGE

59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

CODINGTON COUNTY

S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2017

5 OF 31

DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY HK/MG	Steve A. Johnson BRIDGE ENGINEER
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Hole Number	A1
Station	23+36
Depth	10.5 ft
Soil Color	Brown
Classification	Clay Sand
Strength (Qu)	2,907 psf
Dry Density	114.4 pcf
Wet Density	133.6 pcf
Moisture	16.7 %
Pass No. 10	94.9 %
Pass No. 40	78.0 %
Pass No. 200	54.0 %
Sand Content	40.9 %
Silt Content	32.4 %
Clay Content	21.6 %

Hole Number	A1
Station	23+36
Depth	40.5 ft
Soil Color	Gray
Classification	Sandy Gravel
Strength (Qu)	No Test
Dry Density	NA pcf
Wet Density	NA pcf
Moisture	9.7 %
Pass No. 10	42.4 %
Pass No. 40	12.0 %
Pass No. 200	6.9 %
Sand Content	35.5 %
Silt Content	5.7 %
Clay Content	1.2 %

Hole Number	A1
Station	23+36
Depth	55.5 ft
Soil Color	Gray
Classification	Clay Silt
Strength (Qu)	2,167 psf
Dry Density	109.2 pcf
Wet Density	128.3 pcf
Moisture	17.5 %
Pass No. 10	95.9 %
Pass No. 40	85.7 %
Pass No. 200	65.2 %
Sand Content	30.7 %
Silt Content	35.6 %
Clay Content	29.5 %

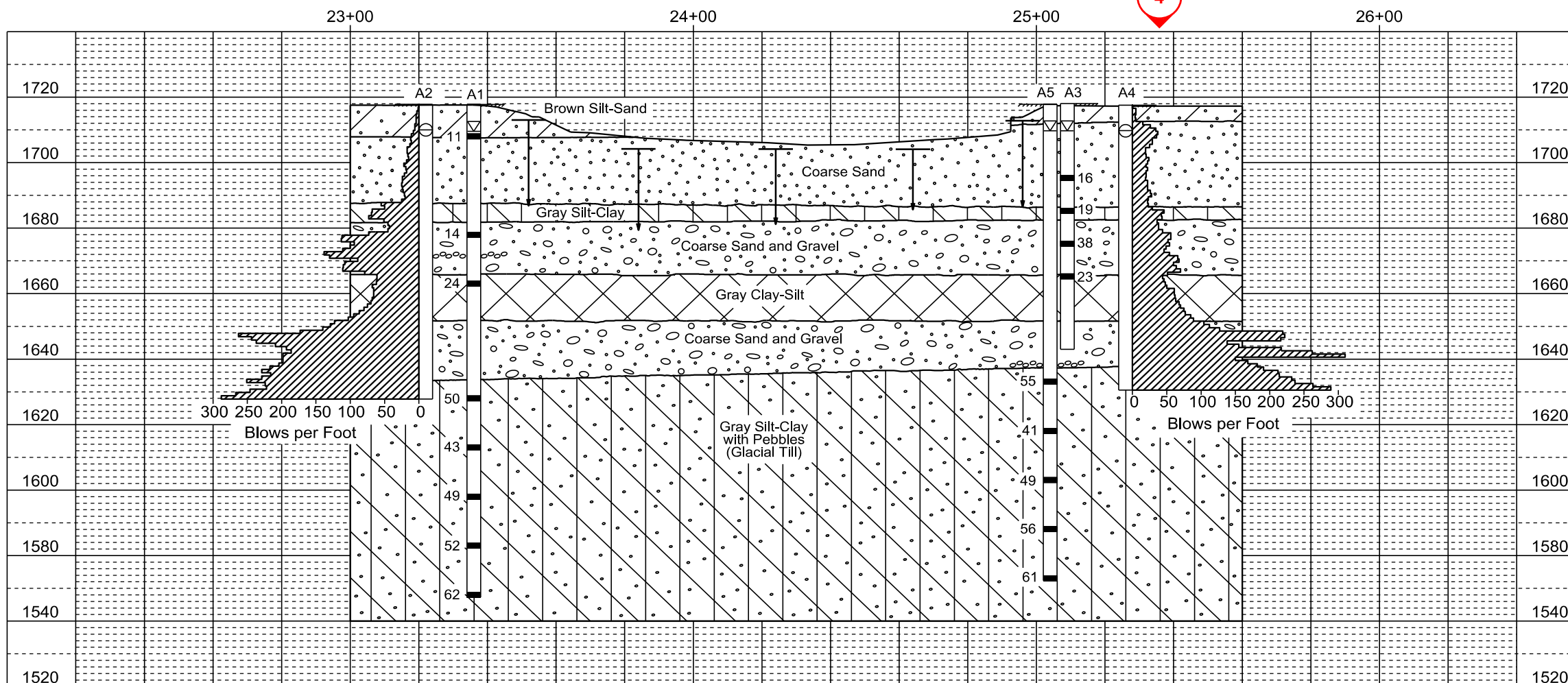
Hole Number	A3
Station	25+09
Depth	23.2 ft
Soil Color	Brown
Classification	Clay Sand
Strength (Qu)	1,573 psf
Dry Density	111.9 pcf
Wet Density	131.9 pcf
Moisture	17.9 %
Pass No. 10	95.1 %
Pass No. 40	78.5 %
Pass No. 200	53.9 %
Sand Content	41.4 %
Silt Content	28.8 %
Clay Content	25.1 %

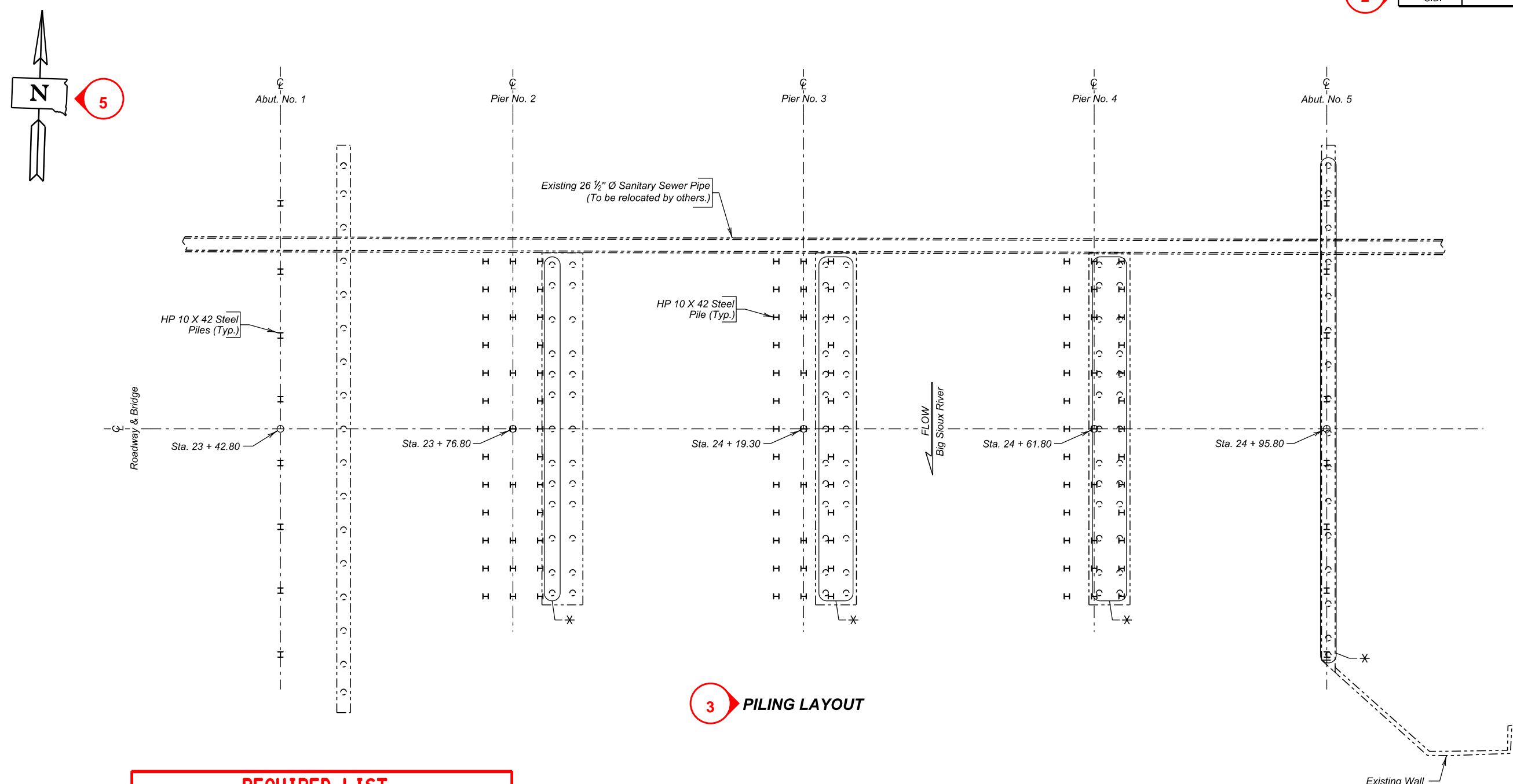
Hole Number	A3
Station	25+09
Depth	33.5 ft
Soil Color	Gray/Brown
Classification	Silt Clay
Strength (Qu)	3,778 psf
Dry Density	105 pcf
Wet Density	126.2 pcf
Moisture	20.2 %
Pass No. 10	98.8 %
Pass No. 40	95.3 %
Pass No. 200	75.2 %
Sand Content	23.5 %
Silt Content	40.9 %
Clay Content	34.4 %

COFFERDAM SOIL PARAMETERS

	Friction Angle (φ)	Cohesion (c)	Wet Unit Weight (γ _w)
Silt-Sand	30°	50 psf	120 pcf
Coarse Sand	34°	0 psf	130 pcf
Silt-Clay	17°	900 psf	126 pcf
Coarse Sand and Gravel	34°	0 psf	133 pcf
Clay-Silt	27°	650 psf	128 pcf

4





3

PILING LAYOUT

REQUIRED LIST	
① Title Block	④ Estimated Quantities
② Project Block	⑤ North Arrow
③ Plan View (Piling Layout)	

NOTE :
This sheet is to be used in conjunction with the
SUBSURFACE INVESTIGATION AND PILING LAYOUT sheet.

NOTE:
* Existing timber pile to be extracted.

4

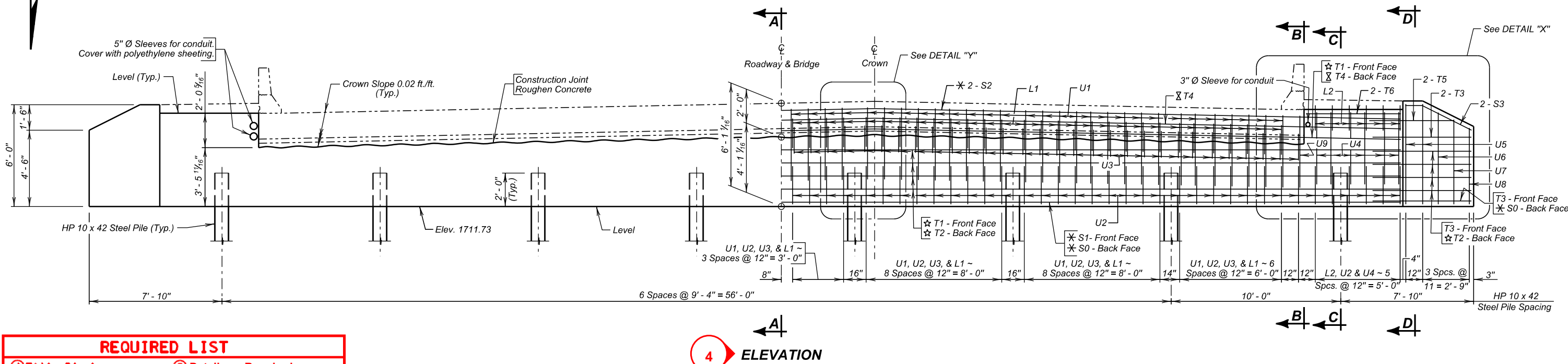
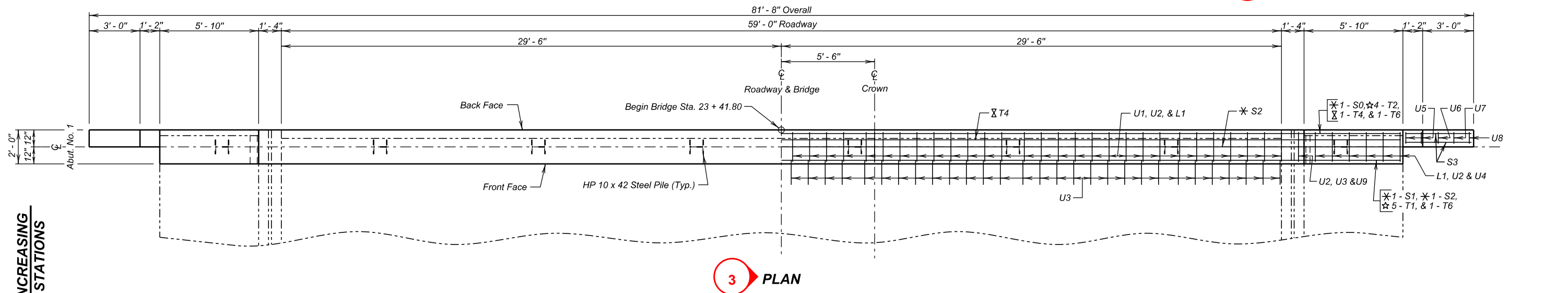
ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Extract Pile	Each	81

1

PILING LAYOUT DETAILS

FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017



- REQUIRED LIST
- 1Title Block

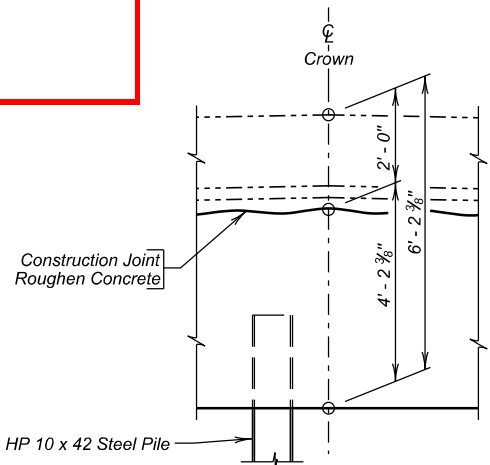
2Project Block

3Plan View

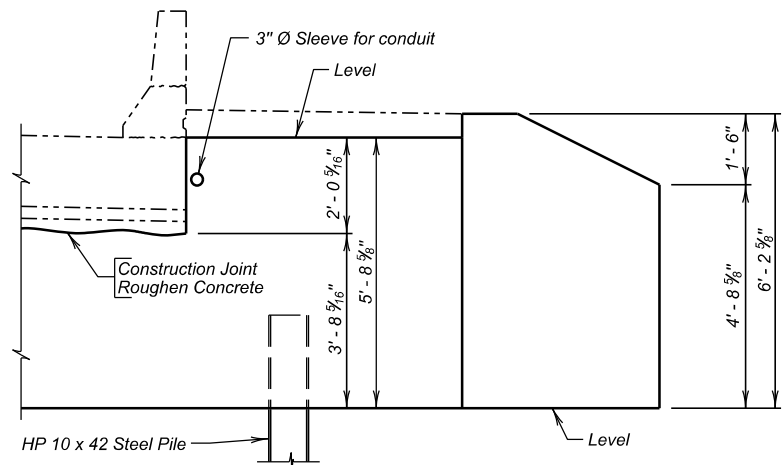
4Elevation View

5Details as Required

* Min. Lap 4'-2"
☆ Min. Lap 2'-5"
⌘ Min. Lap 2'-11"



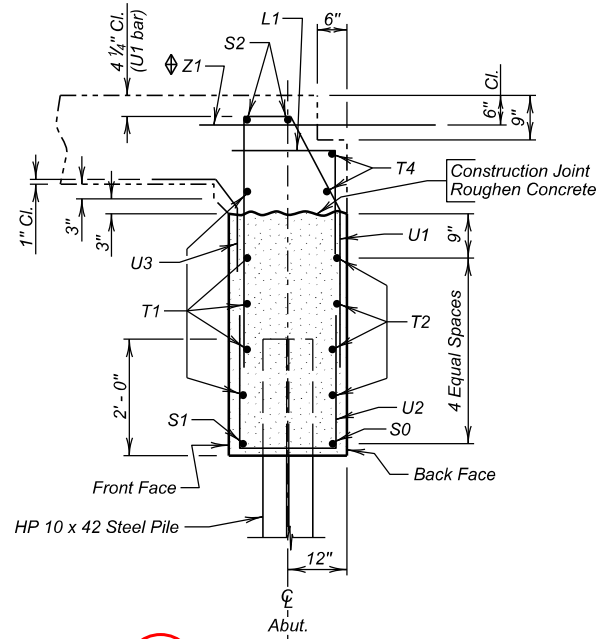
5 DETAIL "Y"
(Resteel not shown)



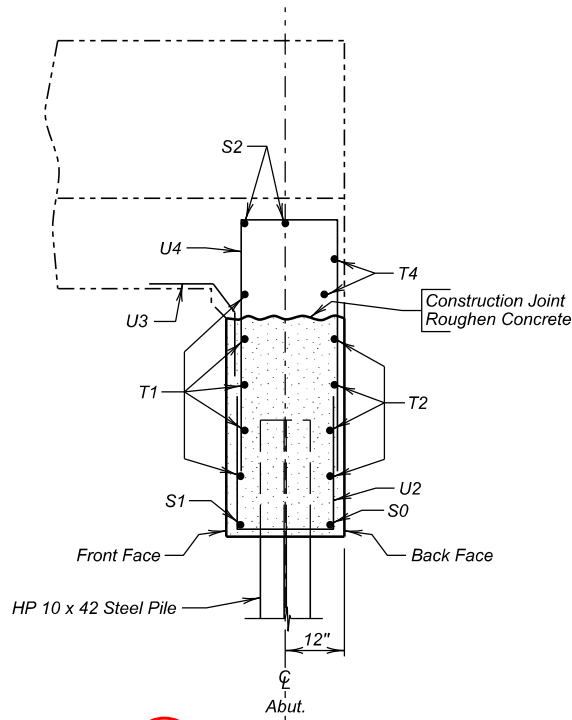
5 DETAIL "X"
(Resteel not shown)

1 ABUTMENT NO. 1 DETAILS (A)
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

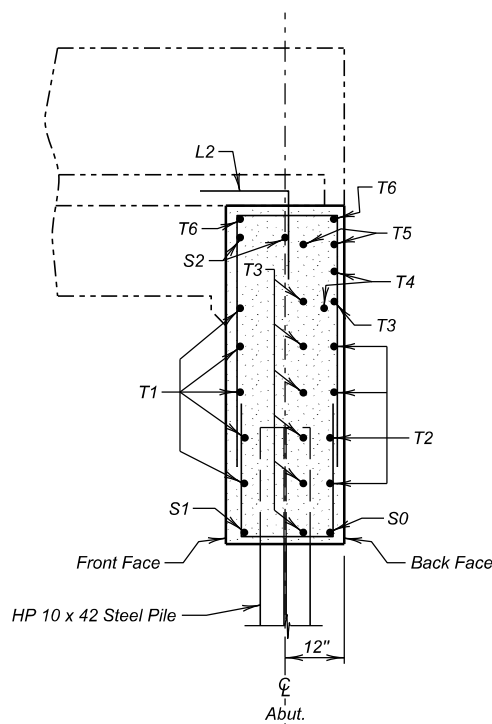
NOTE:
Quantity for Z1 bars are listed on the
SUPERSTRUCTURE DETAILS Sheet.



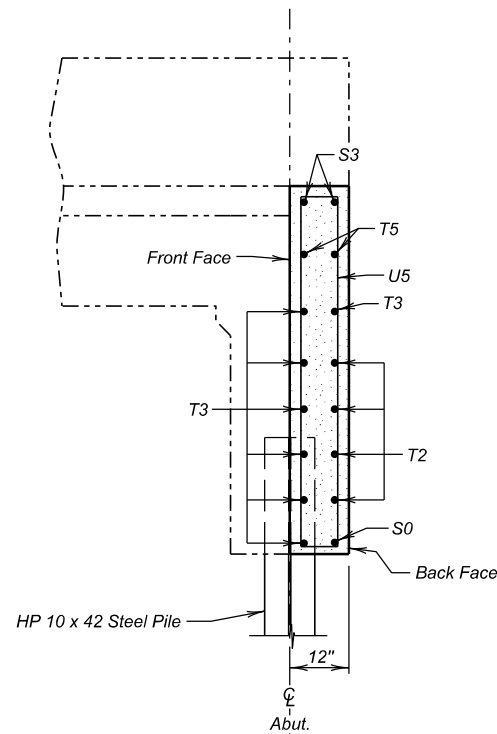
5 SEC. A - A



5 SEC. B - B



5 SEC. C - C



5 SEC. D - D

2

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			

3

REINFORCING SCHEDULE

	Mk.	No.	Size	Length	Type	Bending Details	
Δ	L1	58	4	3' - 6"	17A		<p>Type 19B</p> <p>Type 17</p>
Δ	L2	12	4	3' - 0"	17A		
	S0	2	9	42' - 9"	Str.		
	S1	2	9	38' - 7"	Str.		
≠ Δ	S2	4	9	38' - 7"	Str.		
	S3	4	9	4' - 3"	19B		
	T1	10	5	39' - 4"	17A		
	T2	8	5	41' - 11"	Str.		
	T3	14	5	5' - 10"	Str.		
≠ Δ	T4	4	5	38' - 0"	Str.		
	T5	4	5	5' - 0"	Str.		<p>Type 17A</p> <p>Type T1</p> <p>Type 18</p>
	T6	4	5	5' - 7"	Str.		
Δ	U1	58	6	9' - 6"	18		
	U2	72	4	6' - 2"	17		
Δ	U3	60	4	2' - 10"	S12A		
	U4	12	6	10' - 2"	17		
	U5	4	4	13' - 4"	T1		
	U6	2	4	12' - 4"	T1		
	U7	2	4	11' - 6"	T1		
	U8	2	4	10' - 6"	T1		
Δ	U9	2	6	10' - 2"	17		

NOTES:
All dimensions are out to out of bars.
Δ Bars to be Epoxy Coated.
≠ Bend in field as necessary to fit.

4

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Class A45 Concrete, Bridge	Cu. Yd.	24.3
Reinforcing Steel	Lb.	2062
Epoxy Coated Reinforcing Steel	Lb.	1815
Structure Excavation, Bridge	Cu. Yd.	15.4
HP 10 x 42 Steel Test Pile, Furnish & Drive	Ft.	1 @ 110' = 110'
HP 10 x 42 Steel Bearing Pile, Furnish & Drive	Ft.	7 @ 105' = 735'
Preboring Pile	Ft.	8 @ 10' = 80'

REQUIRED LIST

- 1 Title Block
- 2 Project Block
- 3 Reinforcing Schedule
- 4 Estimated Quantities
- 5 Sections as Required

1

ABUTMENT NO. 1 DETAILS (B)

FOR

155' - 0" CONT. CONCRETE BRIDGE

59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

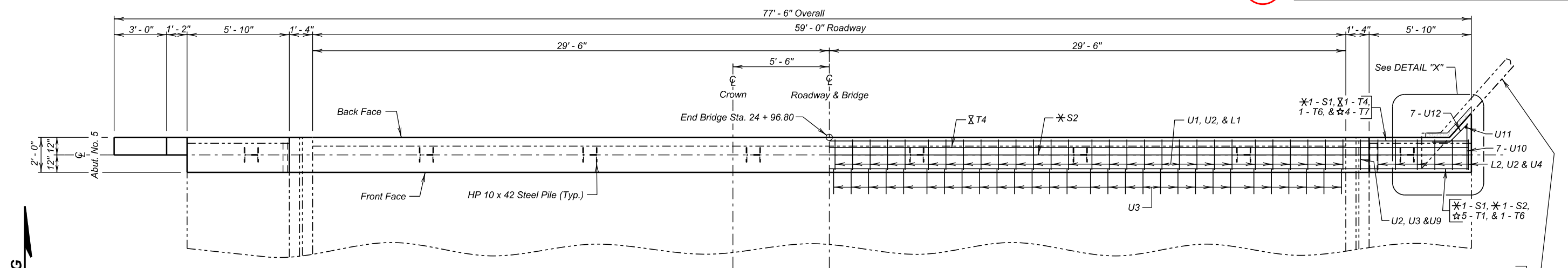
CODINGTON COUNTY

S. D. DEPT. OF TRANSPORTATION

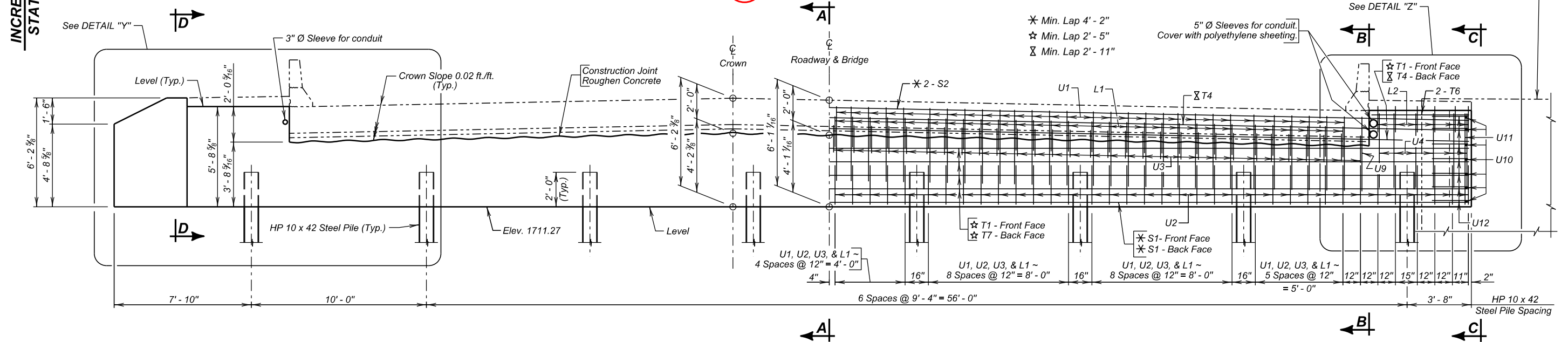
SEPTEMBER 2017

8 OF 31

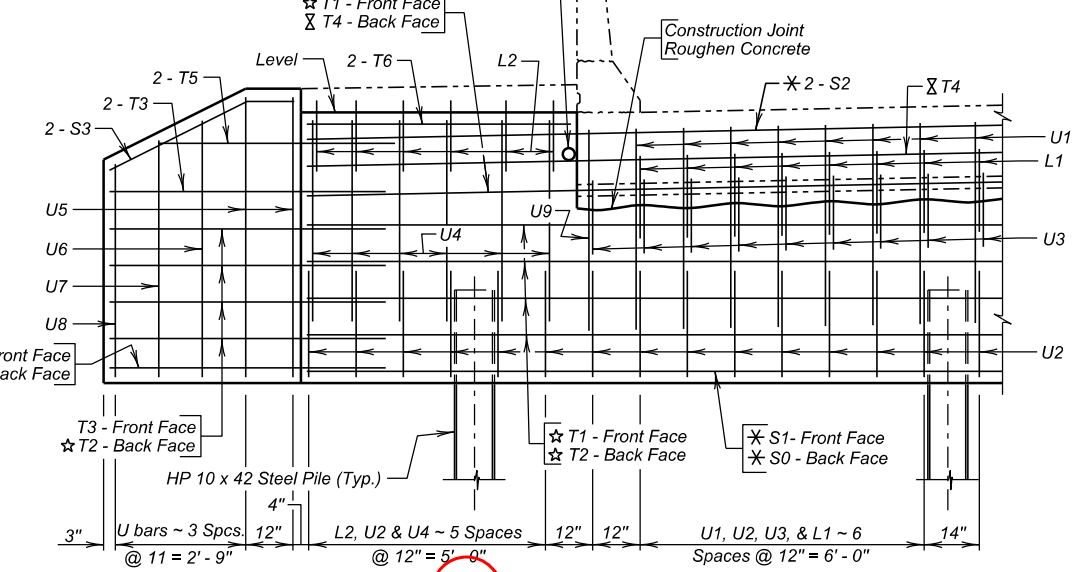
DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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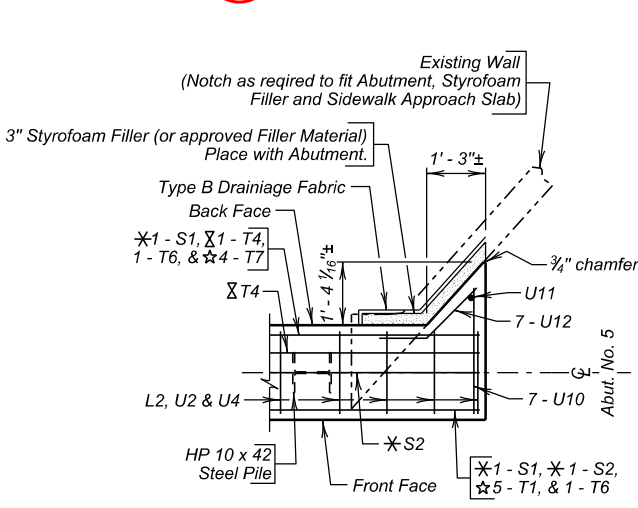
3 PLAN



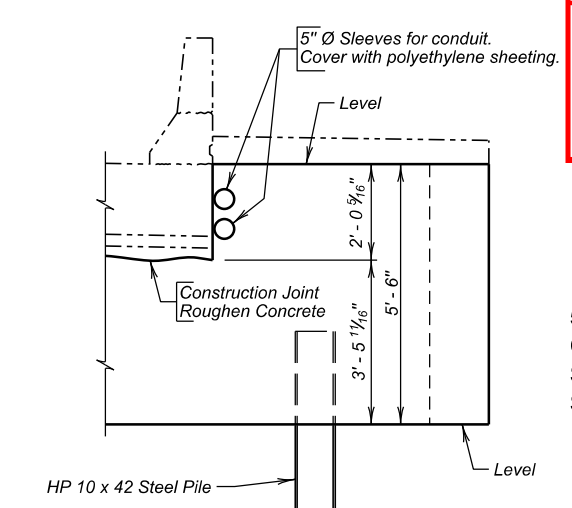
4 ELEVATION



5 DETAIL "Y"



5 DETAIL "X"



5 DETAIL "Z"
(Resteel not shown)

- REQUIRED LIST
- 1 Title Block

2 Project Block

3 Plan View

4 Elevation View

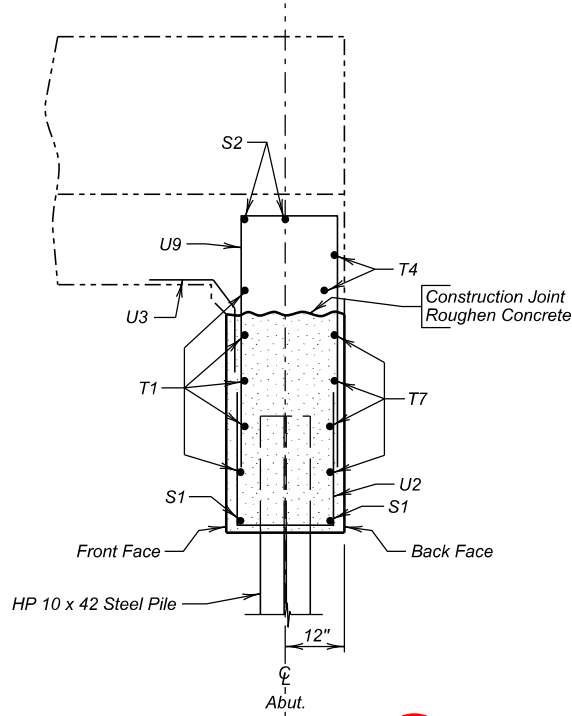
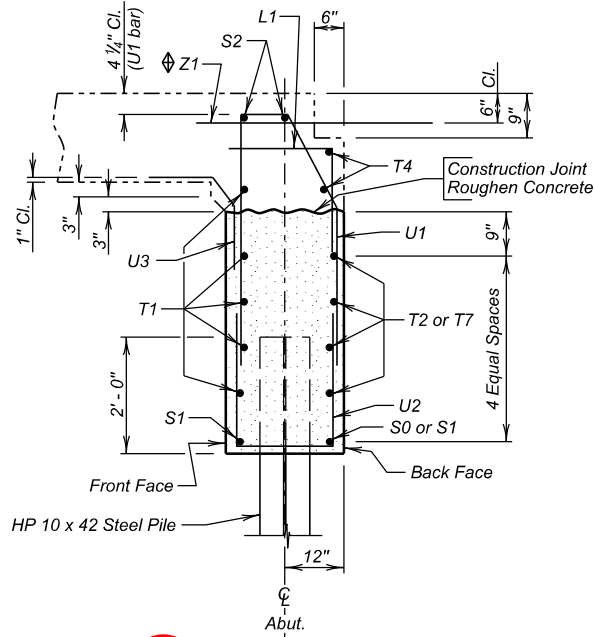
5 Details as Required

1 ABUTMENT NO. 5 DETAILS (A)
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS
OVER BIG SIOUX RIVER
STA. 23 + 41.80 TO 24 + 96.80
STR. NO. 15-181-180

0° SKEW
SEC. 31/6-T117/116N-R52W
NH 0212(168)376
HL-93

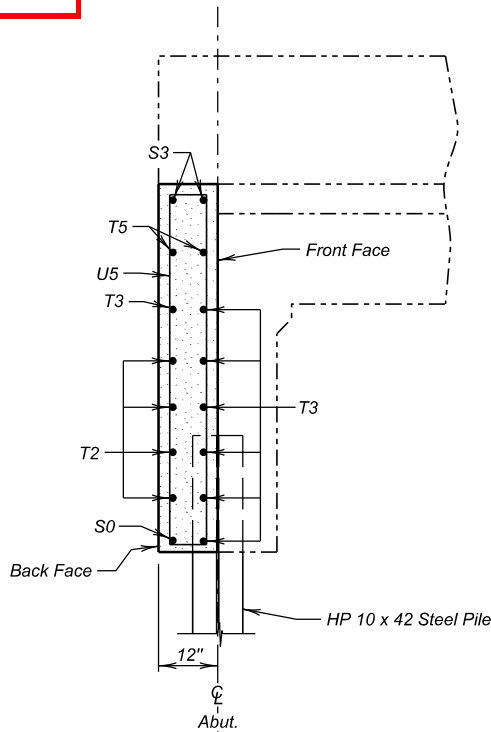
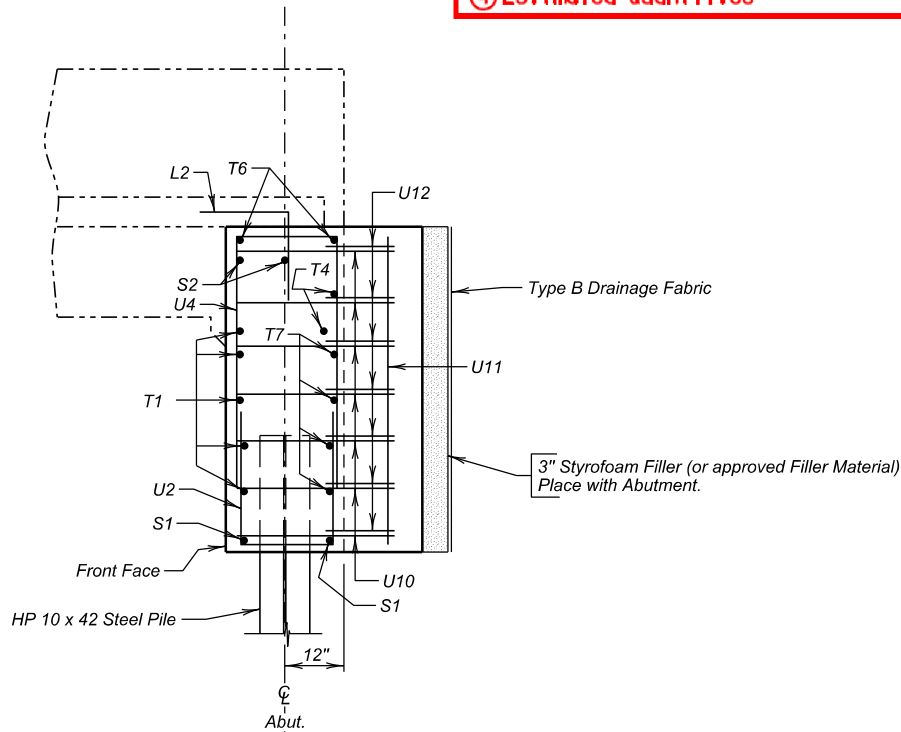
CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017

NOTE:
Quantity for Z1 bars are listed on the
SUPERSTRUCTURE DETAILS Sheet.



REQUIRED LIST

- | | |
|------------------------|------------------------|
| ① Title Block | ⑤ Sections as Required |
| ② Project Block | ⑥ Views as Required |
| ③ Reinforcing Schedule | |
| ④ Estimated Quantities | |



2

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			

3

REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type	Bending Details
Δ	L1	58	4	3' - 6"	17A
Δ	L2	12	4	3' - 0"	17
	S0	1	9	42' - 9"	Str.
#	S1	3	9	38' - 7"	Str.
#	S2	4	9	38' - 7"	Str.
	S3	2	9	4' - 3"	19B
	T1	10	5	39' - 4"	17A
	T2	4	5	41' - 11"	Str.
	T3	7	5	5' - 10"	Str.
#	T4	4	5	38' - 0"	Str.
	T5	2	5	5' - 0"	Str.
	T6	4	5	5' - 7"	Str.
#	T7	4	5	38' - 0"	Str.
Δ	U1	58	6	9' - 6"	18
	U2	72	4	6' - 2"	17
Δ	U3	60	4	2' - 10"	S12A
	U4	12	6	10' - 2"	17
	U5	2	4	13' - 4"	T1
	U6	1	4	12' - 4"	T1
	U7	1	4	11' - 6"	T1
	U8	1	4	10' - 6"	T1
Δ	U9	2	6	10' - 2"	17
	U10	7	5	2' - 8"	Str.
	U11	1	5	5' - 2"	Str.
	U12	7	5	2' - 5"	19B

NOTES:
All dimensions are out to out of bars.
Δ Bars to be Epoxy Coated.
Bend in field as necessary to fit.

4

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Class A45 Concrete, Bridge	Cu. Yd.	23.6
Reinforcing Steel	Lb.	1951
Epoxy Coated Reinforcing Steel	Lb.	1815
Structure Excavation, Bridge	Cu. Yd.	15.0
HP 10 x 42 Steel Test Pile, Furnish & Drive	Ft.	1 @ 110' = 110'
HP 10 x 42 Steel Bearing Pile, Furnish & Drive	Ft.	7 @ 105' = 735'
Preboring Pile	Ft.	8 @ 10' = 80'

The cost for furnishing and installing Styrofoam filler and Type B Drainage Fabric shall be incidental to the contract unit price per cubic yard for Class A45 Concrete, Bridge.

1

ABUTMENT NO. 5 DETAILS (B)

FOR

155' - 0" CONT. CONCRETE BRIDGE

59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

CODINGTON COUNTY

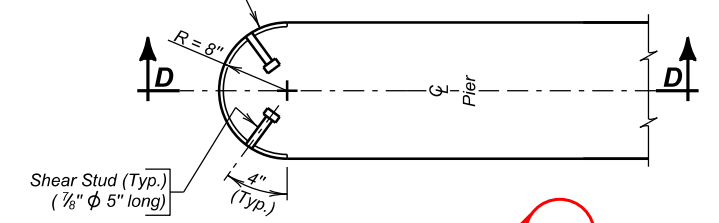
S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2017

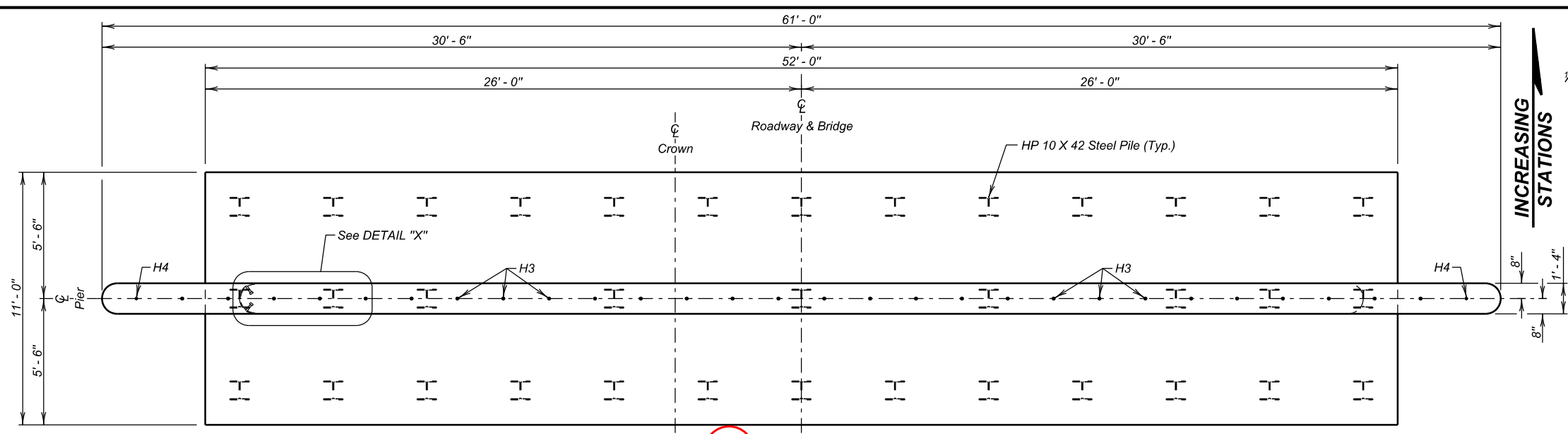
10 OF 31

DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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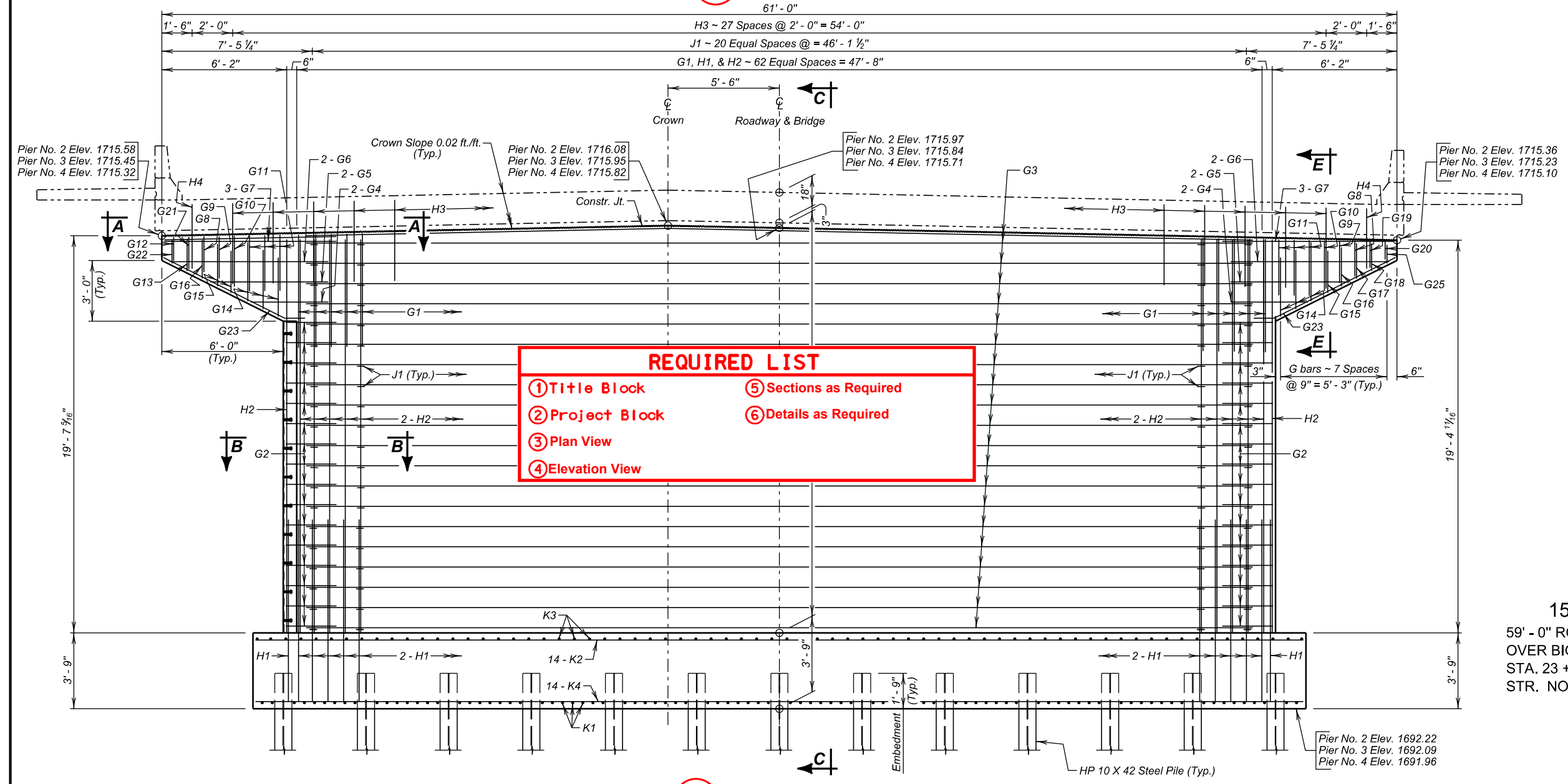
2
1/2" Galvanized R. 24" x 15' - 8"
at upstream edge
(1 required at each pier)



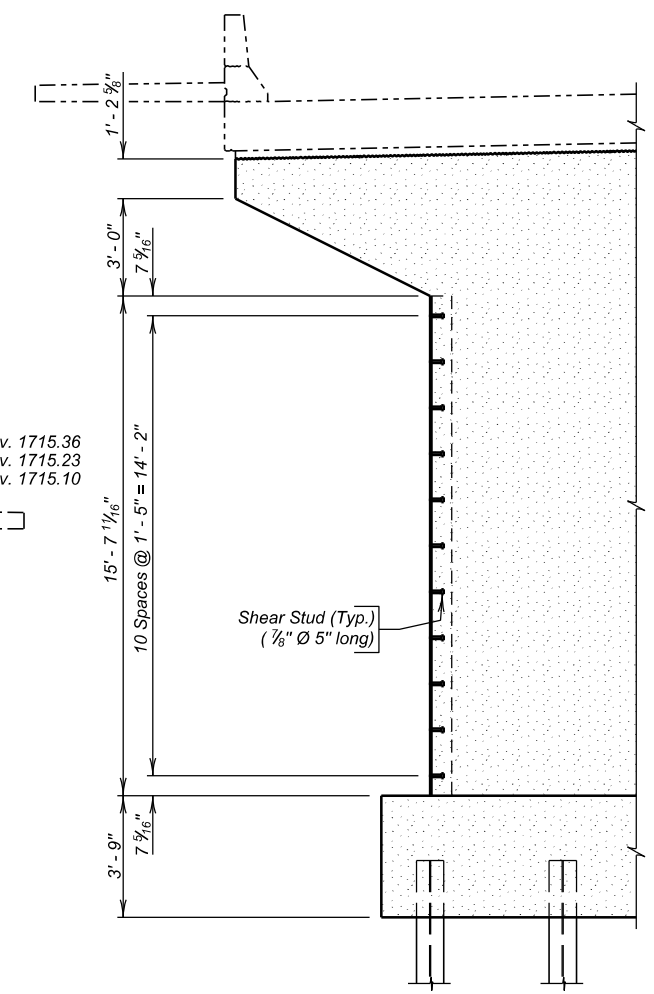
DETAIL "X" 6



3 PLAN



4 ELEVATION



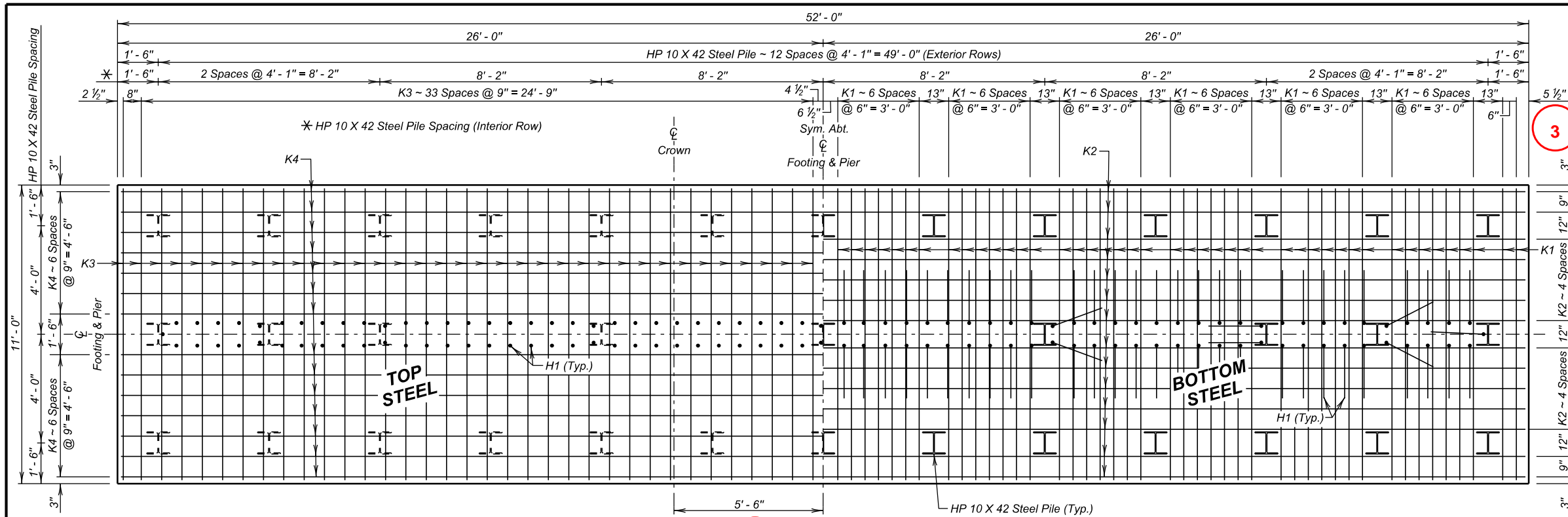
5 SEC. D - D

1 PIER DETAILS (A)
FOR

155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

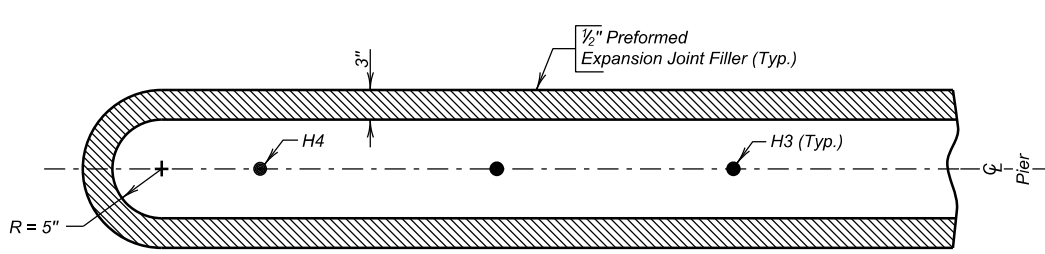
CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017

NOTE:
H1 and H2 bars may be adjusted slightly to clear HP 10 X 42 Steel Pile.

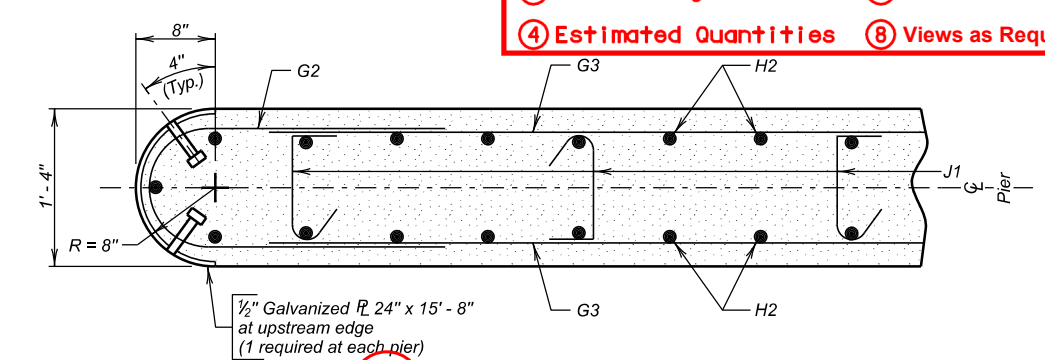


5 PLAN
(Footing Steel)

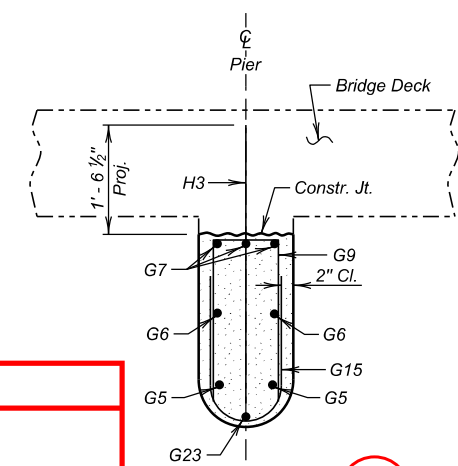
NOTE:
H1 and H2 bars may be adjusted slightly to clear HP 10 X 42 Steel Pile.



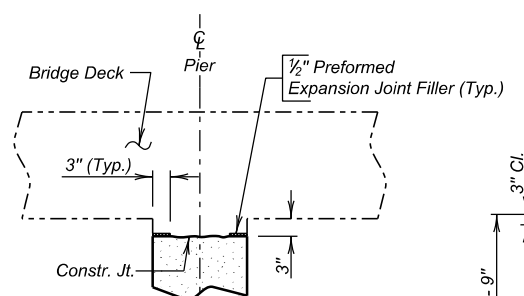
8 VIEW A - A
(Resteel and Bridge Deck not shown)



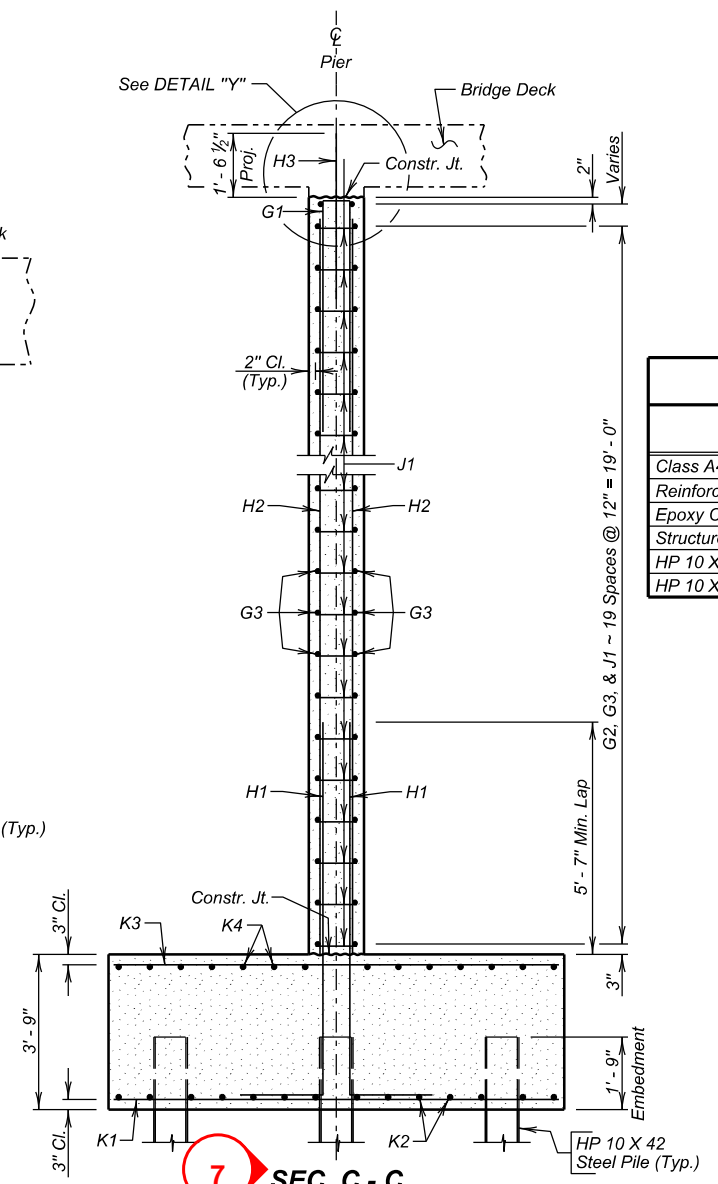
7 SEC. B - B



7 SEC. E - E



6 DETAIL "Y"
(Resteel not shown)



7 SEC. C - C

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			

REINFORCING SCHEDULE					(For One Pier - 3 Required)									
Mk.	No.	Size	Length	Type										
G1	63	10	12'-1"	17										
G2	40	4	5'-7"	S11										
G3	42	4	46'-9"	Str.										
G4	4	4	3'-10"	Str.										
G5	4	4	5'-10"	Str.										
G6	4	4	7'-10"	Str.										
G7	6	9	9'-6"	Str.										
G8	2	5	4'-6"	17										
G9	2	5	5'-2"	17										
G10	2	5	6'-0"	17										
G11	6	5	6'-6"	17										
G12	1	5	3'-4"	17										
G13	1	5	3'-9"	S11										
G14	6	5	6'-5"	S11										
G15	3	5	4'-9"	S11										
G16	2	5	4'-5"	S11										
G17	1	5	4'-1"	S11										
G18	1	5	3'-4"	S11										
G19	1	5	3'-8"	17										
G20	1	5	2'-10"	17										
G21	1	5	4'-2"	17										
G22	3	5	2'-11"	S11										
G23	2	4	7'-8"	19B										
G24	2	4	8'-6"	Str.										
G25	1	5	2'-5"	S11										
H1	128	10	11'-0"	17A										
H2	128	10	19'-5"	Str.										
H3	28	7	4'-0"	Str.										
H4	2	7	3'-0"	Str.										
J1	420	4	1'-9"	T9										
K1	88	7	10'-9"	Str.										
K2	14	5	51'-9"	Str.										
K3	70	4	10'-9"	Str.										
K4	14	4	51'-9"	Str.										

ESTIMATED QUANTITIES				
ITEM	UNIT	QUANTITY		
		Pier No. 2	Pier No. 3	Pier No. 4
Class A45 Concrete, Bridge	Cu. Yd.	128.8	128.8	128.8
Reinforcing Steel	Lb.	26088	26088	26088
Epoxy Coated Reinforcing Steel	Lb.	241	241	241
Structure Excavation, Bridge	Cu. Yd.	462.0	402.1	413.5
HP 10 X 42 Steel Test Pile, Furnish and Drive	Each	1 @ 90' = 90'	1 @ 90' = 90'	1 @ 90' = 90'
HP 10 X 42 Steel Pile, Furnish and Drive	Each	34 @ 85' = 2890'	34 @ 85' = 2890'	34 @ 85' = 2890'

1 PIER DETAILS (B)
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS
OVER BIG SIOUX RIVER
STA. 23 + 41.80 TO 24 + 96.80
STR. NO. 15-181-180

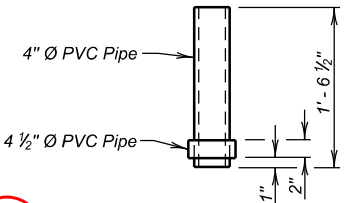
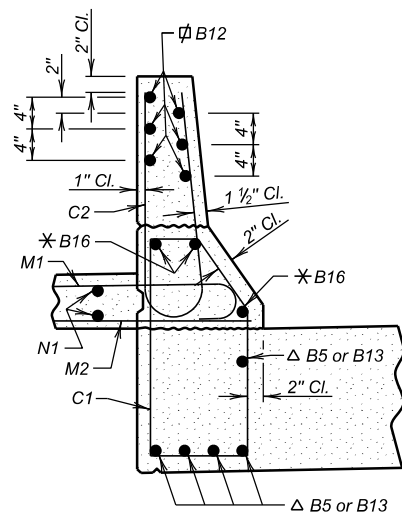
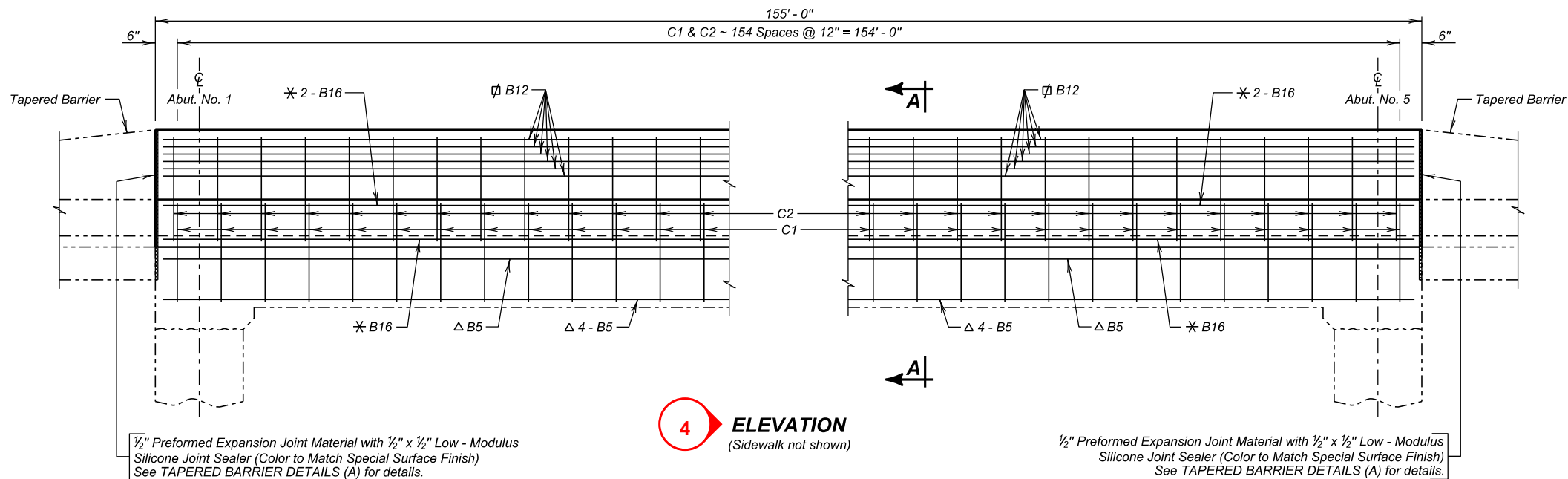
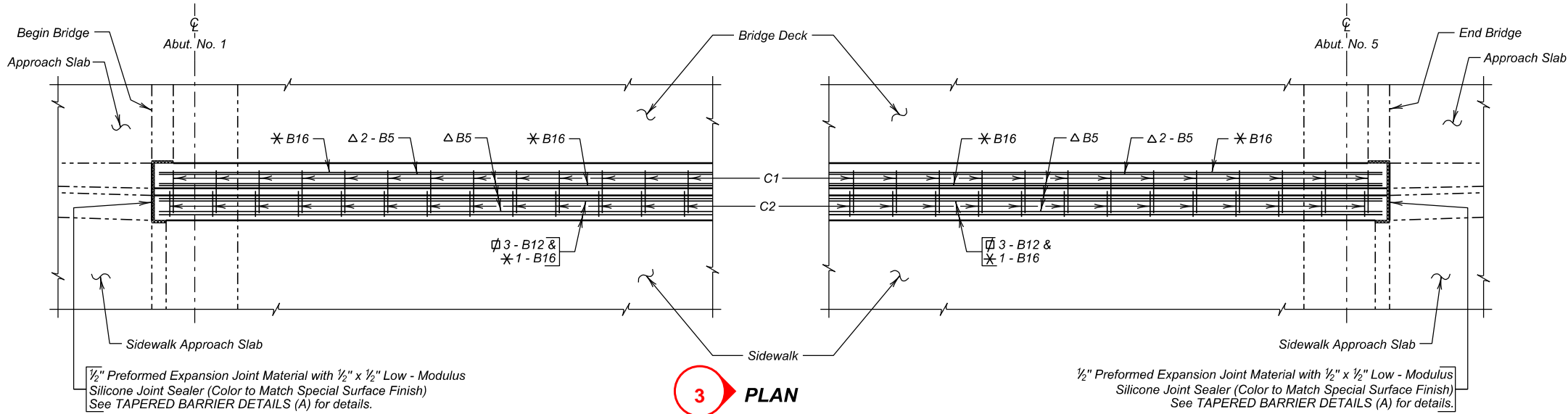
0° SKEW
SEC. 31/6-T117/116N-R52W
NH 0212(168)376
HL-93

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017

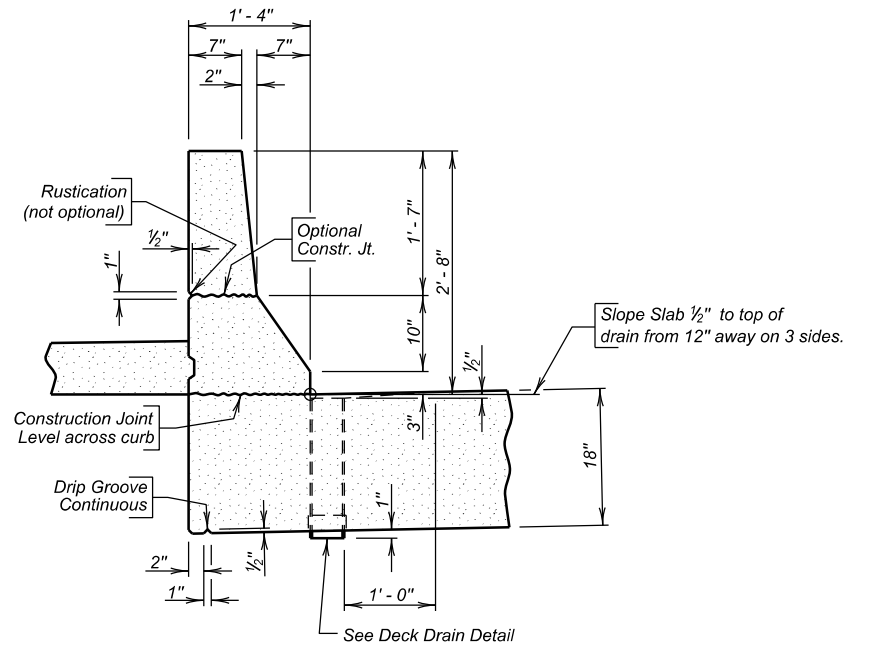
DESIGNED BY PW
CK. DES. BY BB
DRAFTED BY MG

Steve A. Johnson
BRIDGE ENGINEER

12 OF 31



6 DECK DRAIN DETAIL
(See GENERAL DRAWING for spacing of Deck Drains and NOTES (CONTINUED) sheet for deck drain notes.)



5 DRAIN AND BARRIER DETAILS

1 BARRIER CURB & DECK DRAIN DETAILS FOR

155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALK 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017

* Min. Lap = 1' - 0"
Ø Min. Lap = 3' - 6"
Δ Place as shown in Superstructure Details.

REQUIRED LIST

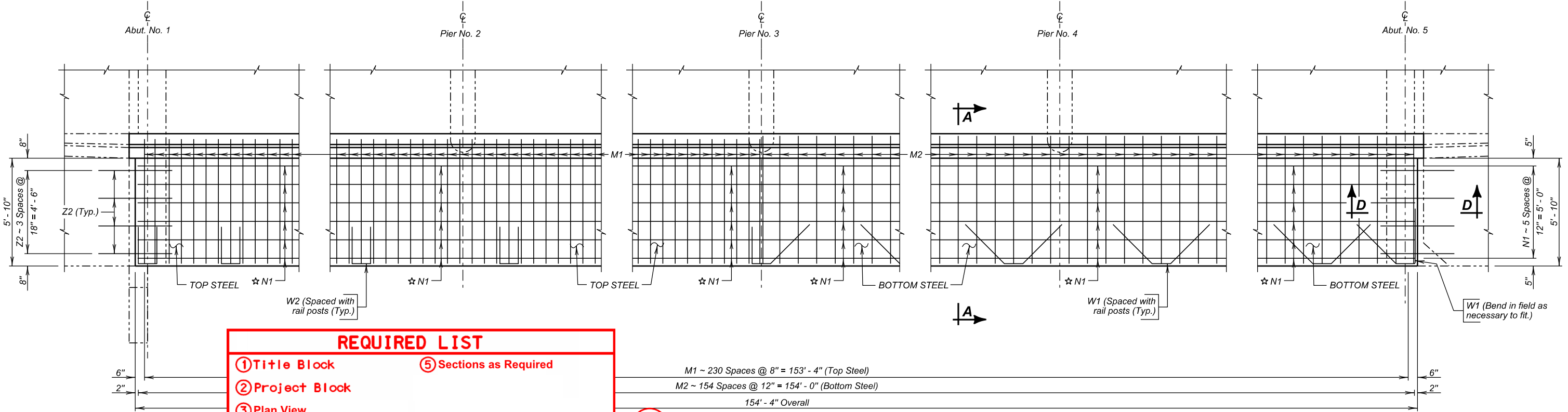
- | | |
|------------------|------------------------|
| 1 Title Block | 5 Sections as Required |
| 2 Project Block | 6 Details as Required |
| 3 Plan View | |
| 4 Elevation View | |

5 SEC. A - A

★ Min. Lap 1' - 10"

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS

2



REQUIRED LIST

1 Title Block

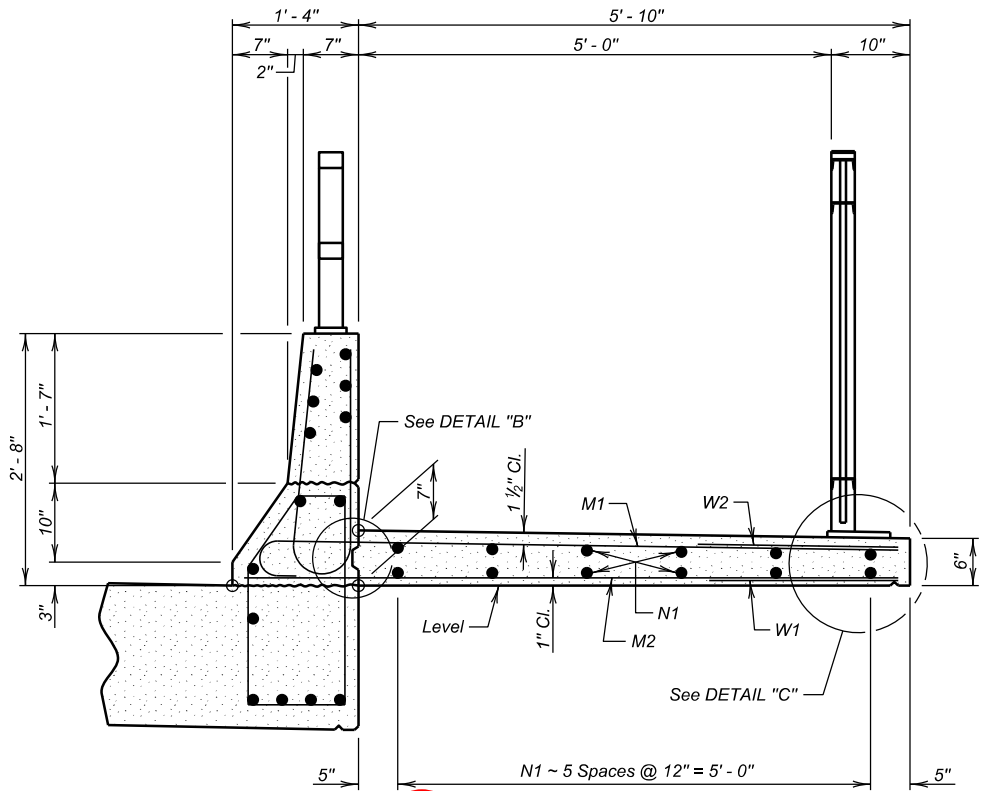
2 Project Block

3 Plan View

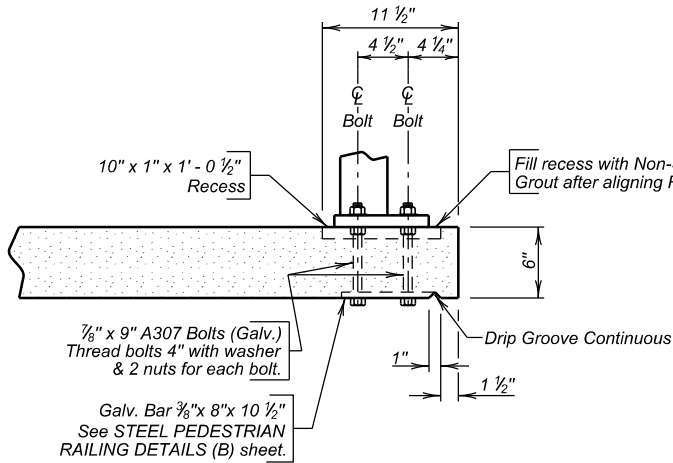
4 Details as Required

5 Sections as Required

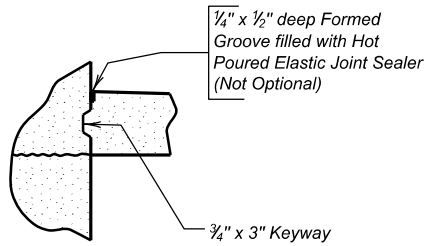
3
PLAN
(South side shown, North side similar opposite hand)



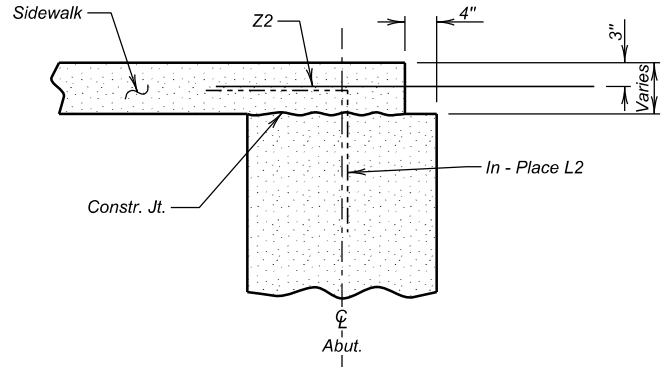
5 SEC. A - A



4 DETAIL "C"



4 DETAIL "B"



5 SEC. D - D
(M & N Bars not shown)

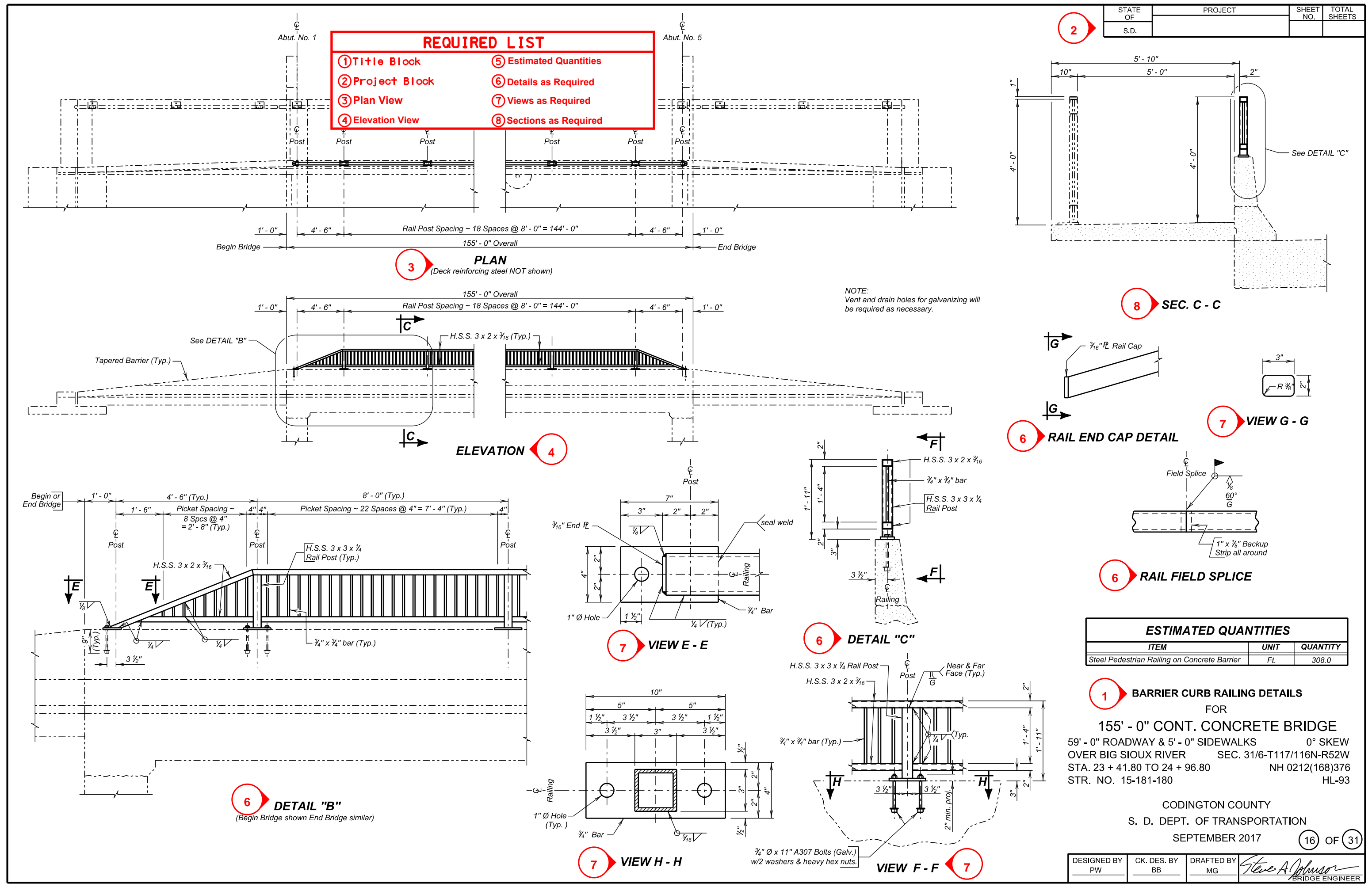
SIDEWALK DETAILS
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017

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NOTE:
For listing of re-bars see SUPERSTRUCTURE DETAILS sheet.

DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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- REQUIRED LIST
- ① Title Block

② Project Block

③ Plan View

④ Elevation View

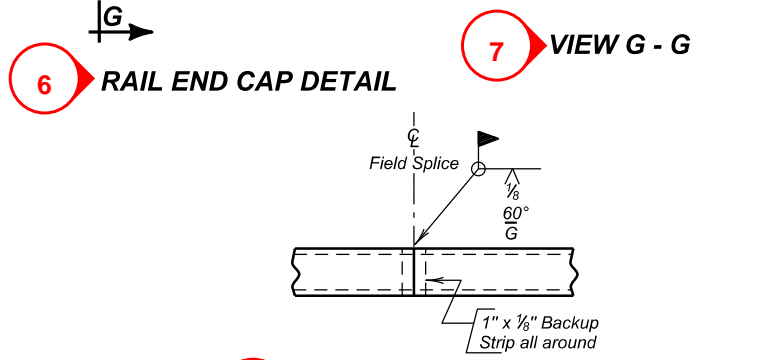
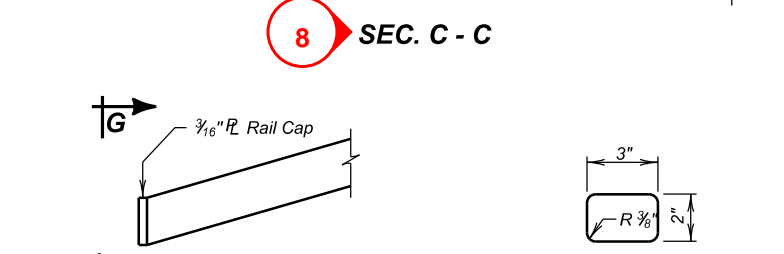
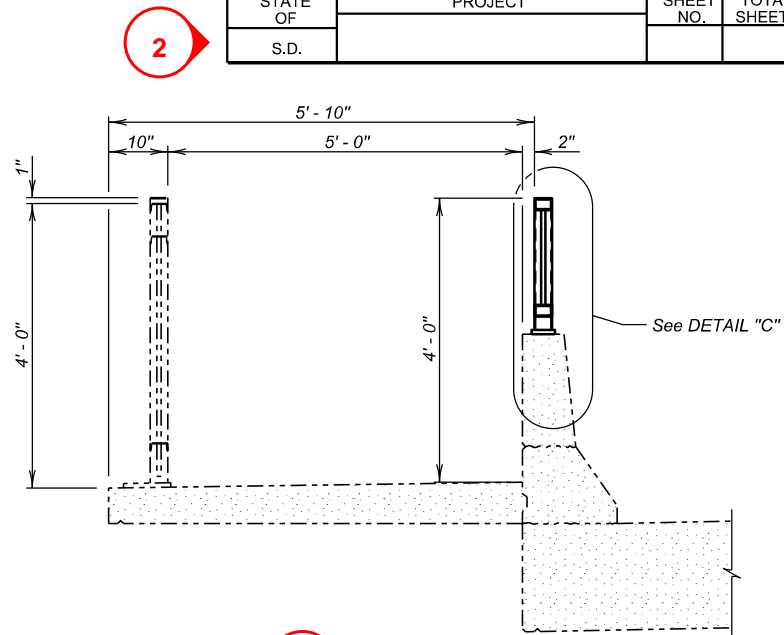
⑤ Estimated Quantities

⑥ Details as Required

⑦ Views as Required

⑧ Sections as Required

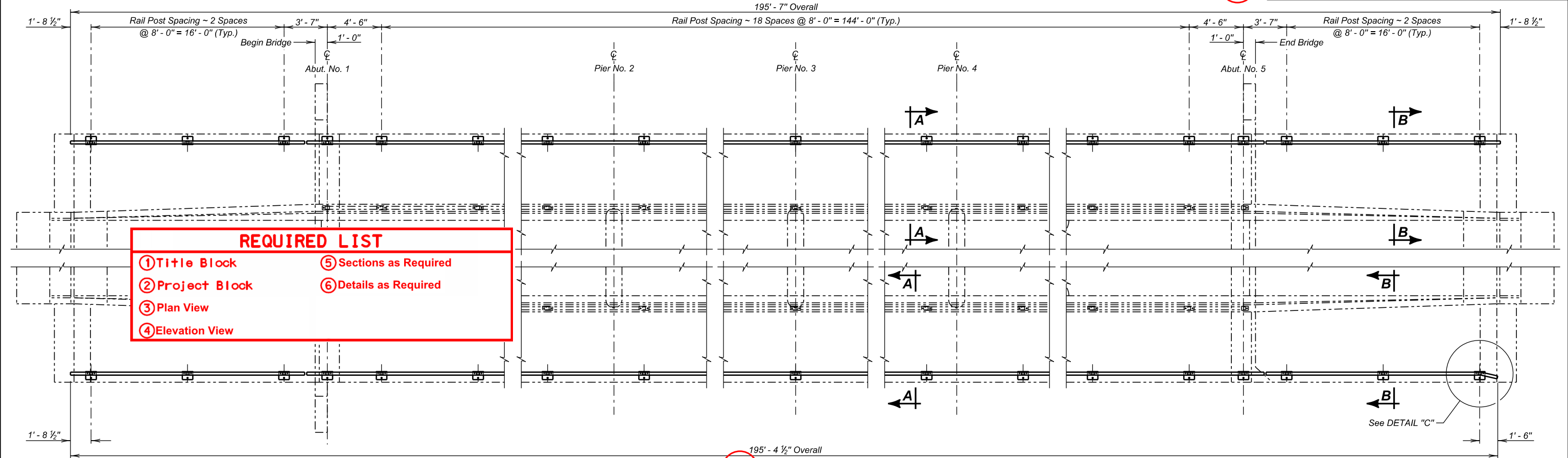
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			



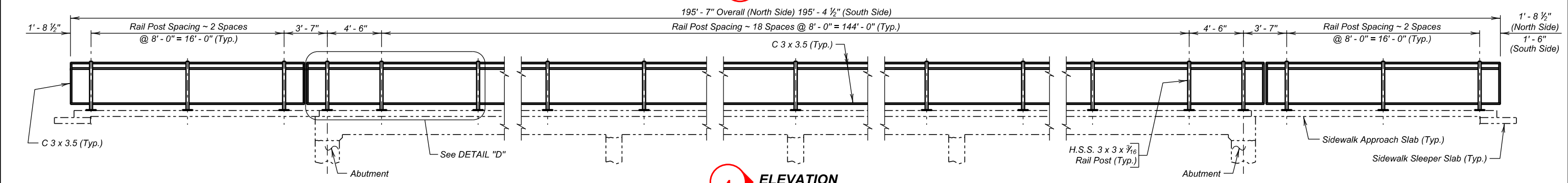
ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Steel Pedestrian Railing on Concrete Barrier	Ft.	308.0

1 BARRIER CURB RAILING DETAILS
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS
OVER BIG SIOUX RIVER
STA. 23 + 41.80 TO 24 + 96.80
STR. NO. 15-181-180

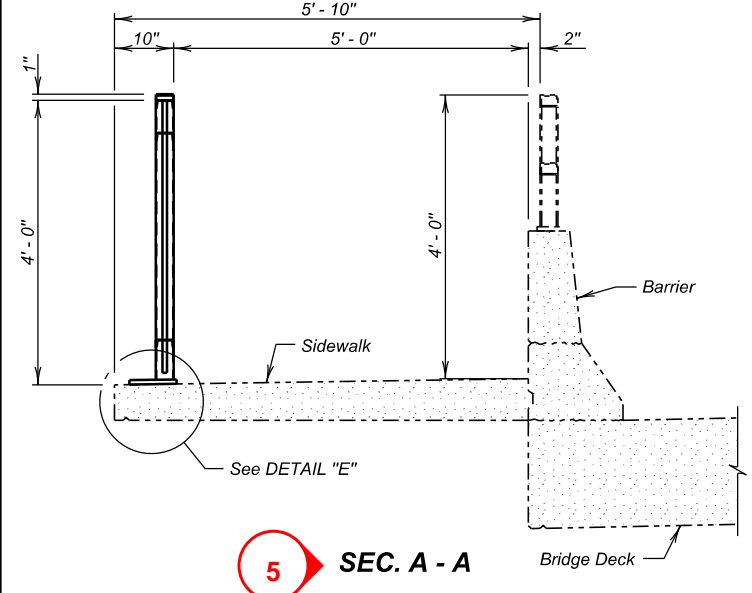
0° SKEW
SEC. 31/6-T117/116N-R52W
NH 0212(168)376
HL-93



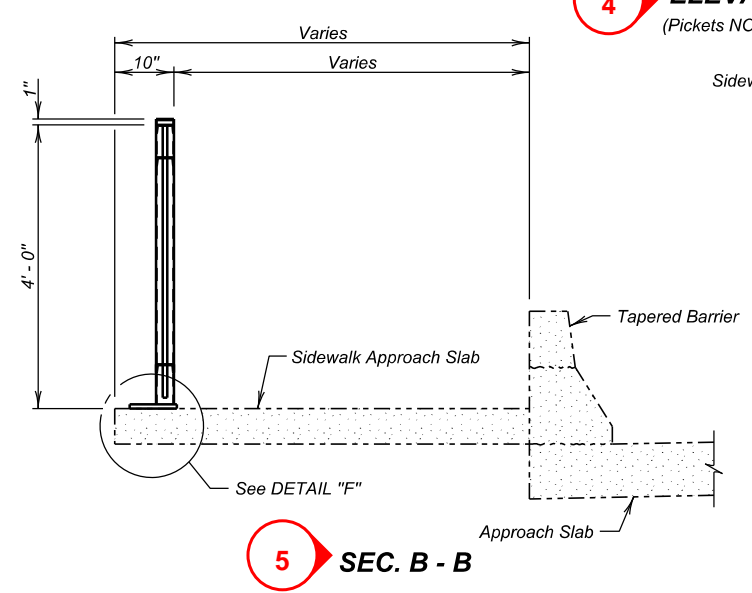
3 PLAN



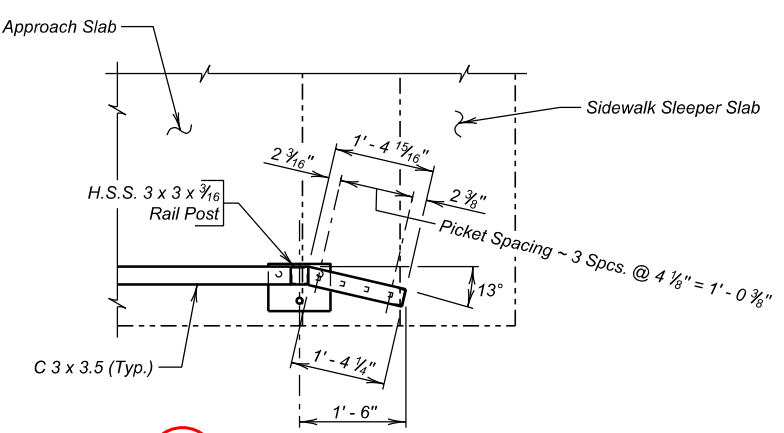
4 ELEVATION (Pickets NOT shown)



5 SEC. A - A



5 SEC. B - B



6 DETAIL "C" (Southeast Corner only)

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Steel Pedestrian Railing on Sidewalk	Ft.	391.0

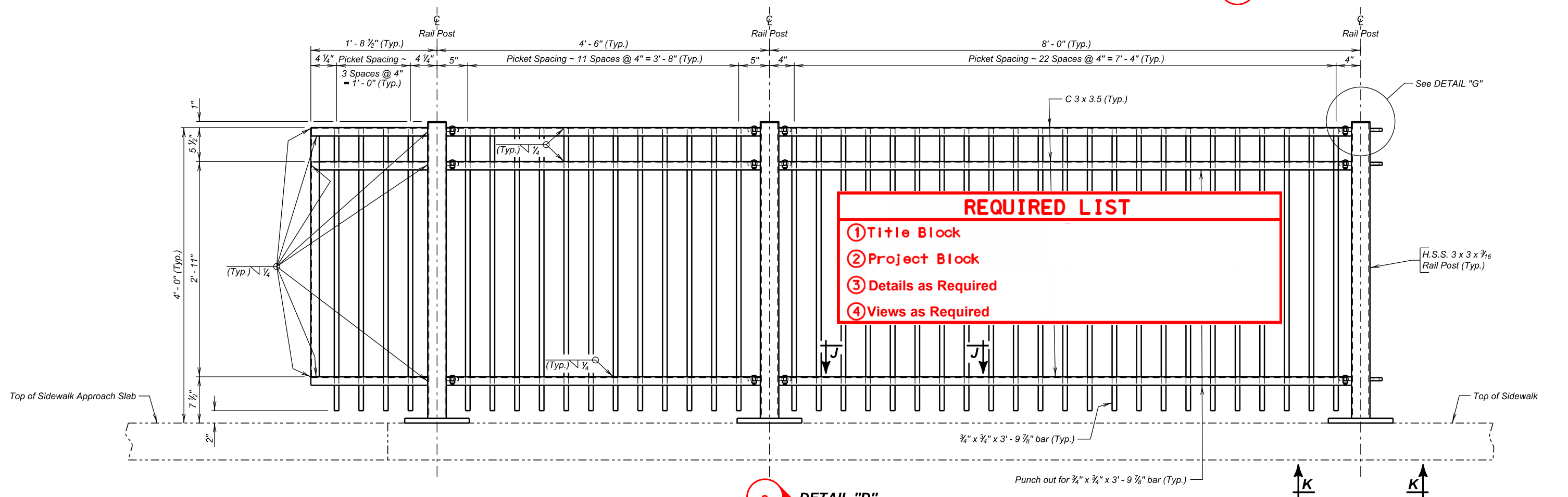
1 STEEL PEDESTRIAN RAILING DETAILS (A) FOR 155' - 0" CONT. CONCRETE BRIDGE

59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW

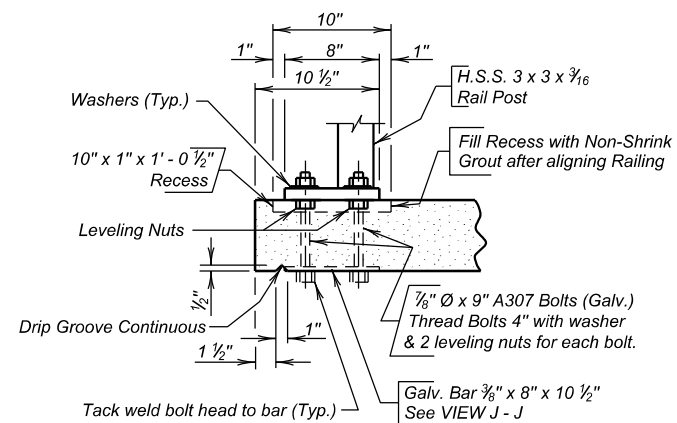
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W

STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376

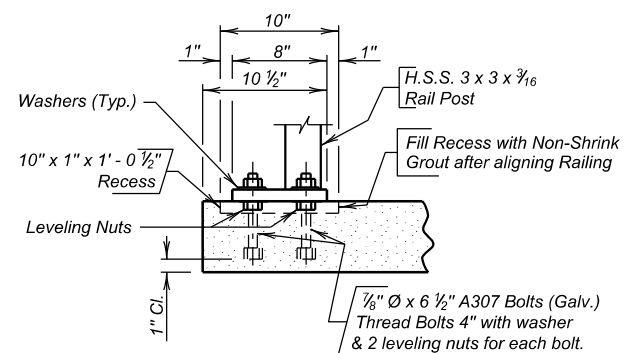
STR. NO. 15-181-180 HL-93



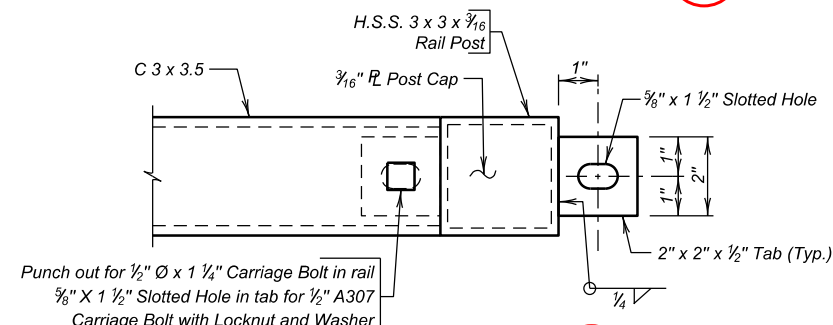
3 **DETAIL "D"**



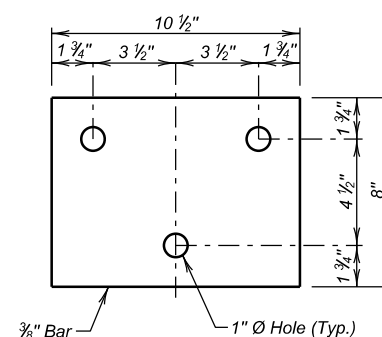
3 **DETAIL "E"**
(Sidewalk)



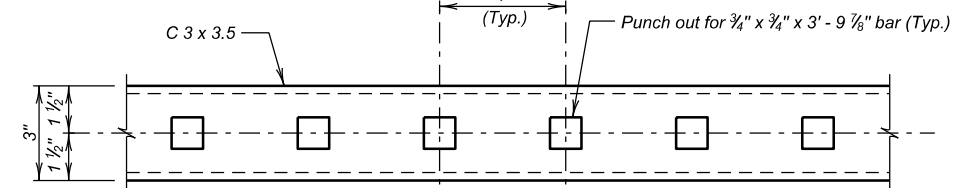
3 **DETAIL "F"**
(Sidewalk Approach Slab)



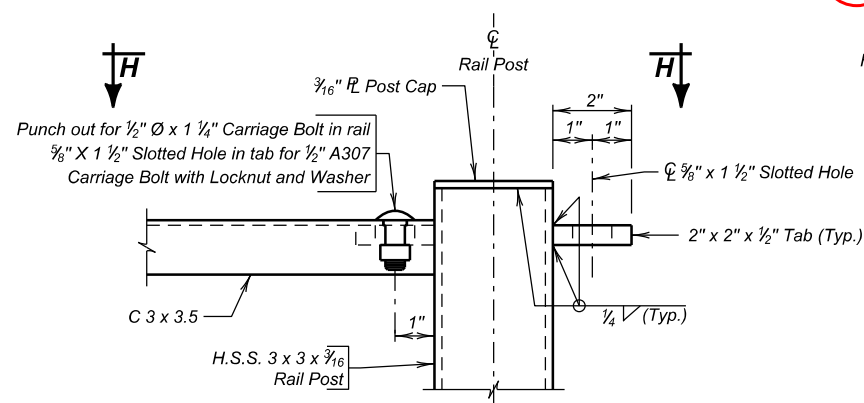
VIEW H - H 
(Carriage Bolt NOT shown)



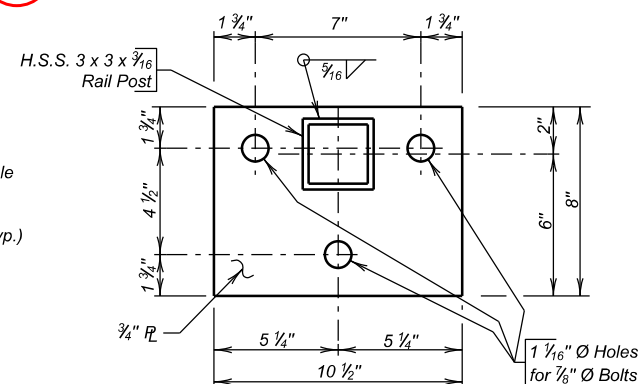
4 **VIEW K - K**



4 **VIEW J - J**
(Pickets NOT shown)



3 **DETAIL "G"**



3 **BASE PLATE DETAIL** (For Steel Pedestrian Railing)

1 STEEL PEDESTRIAN RAILING DETAILS (B)
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

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7



The diagram illustrates a cross-section of a bridge end embankment. Key components and dimensions include:

- Bridge End Embankment:** The overall structure on the left side.
- Granular Bridge End Backfill:** The material directly behind the embankment face.
- Type B Drainage Fabric:** A fabric layer within the embankment, with a width of **1' - 0"**.
- Porous Backfill:** A layer of porous material, also **1' - 0"** wide.
- 6 Mil Polyethylene Sheeting:** A thin barrier layer.
- Non-pervious Backfill Material:** Material to be compacted to the satisfaction of the Engineer.
- Vertical Composite Drain:** A drain system with a width of **3' - 0"**.
- Abutment Backwall:** The vertical wall on the right.
- Controlled Density Fill:** A fill area to the right of the backwall, with a width of **1' - 0"**.
- Top of Berm:** The top edge of the embankment.
- 4" Dia. Slotted Corrugated Polyethylene Drainage Tubing:** A pipe at the base of the embankment.
- Dimensions:**
 - Horizontal dimensions: **1' - 0"** (Type B Drainage Fabric), **1' - 0"** (Porous Backfill), **3' - 0"** (Vertical Composite Drain), **1' - 6"** (bottom section).
 - Vertical dimensions: **1' - 0"** (multiple sections).

8



REQUIRED LIST	
① Title Block	⑤ Section A - A
② Project Block	⑥ Section F - F
③ Estimated Quantities	⑦ Spill Cone Detail
④ Plan View	⑧ Detail "X"

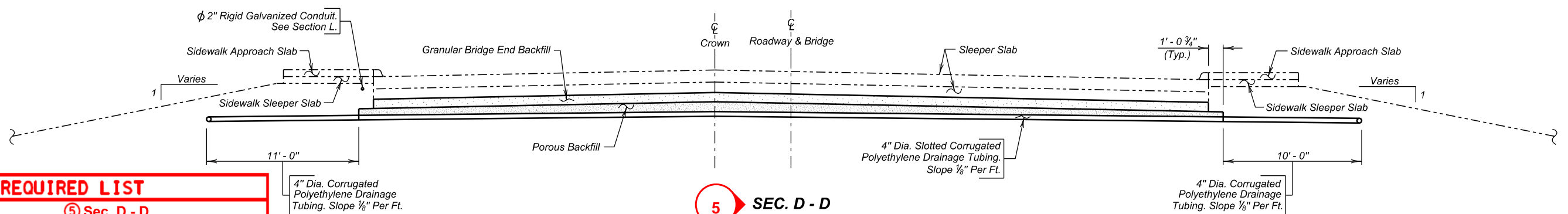
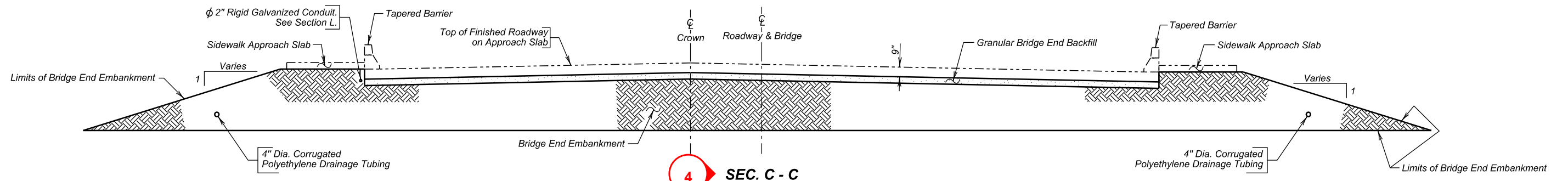
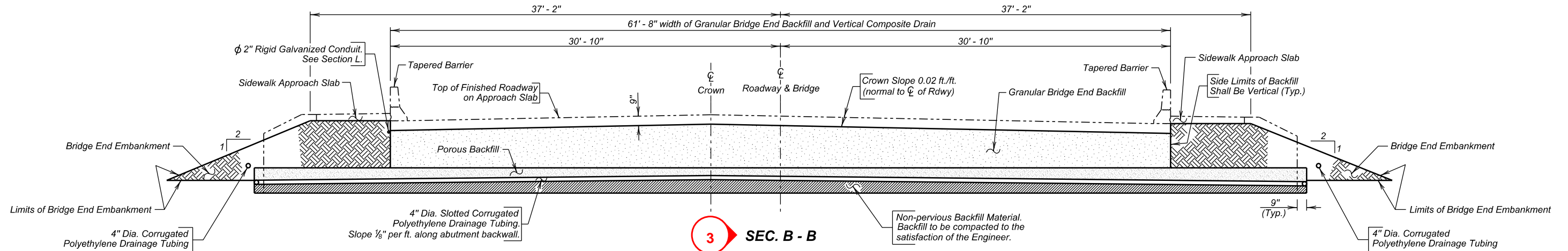
3

- 1

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SEPTEMBER 2017 19

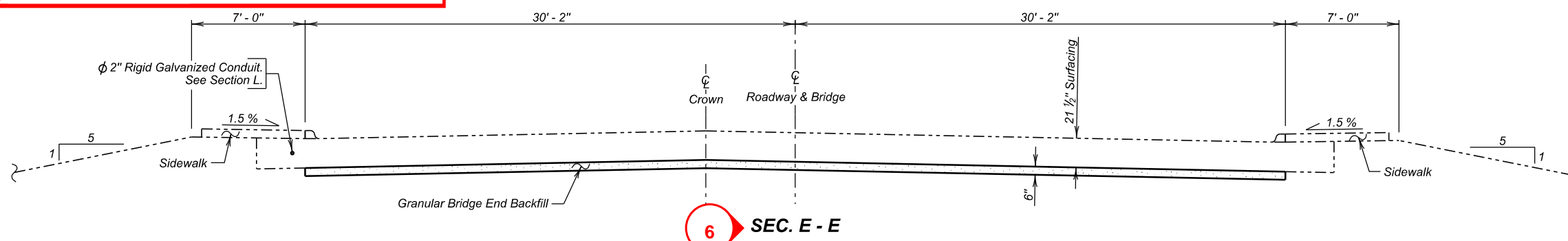
NOTE:
Ø Conduit to be installed with bridge end backfill. See Section L.

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			



REQUIRED LIST

- | | |
|-----------------|--------------|
| ① Title Block | ⑤ Sec. D - D |
| ② Project Block | ⑥ Sec. E - E |
| ③ Sec. B - B | |
| ④ Sec. C - C | |

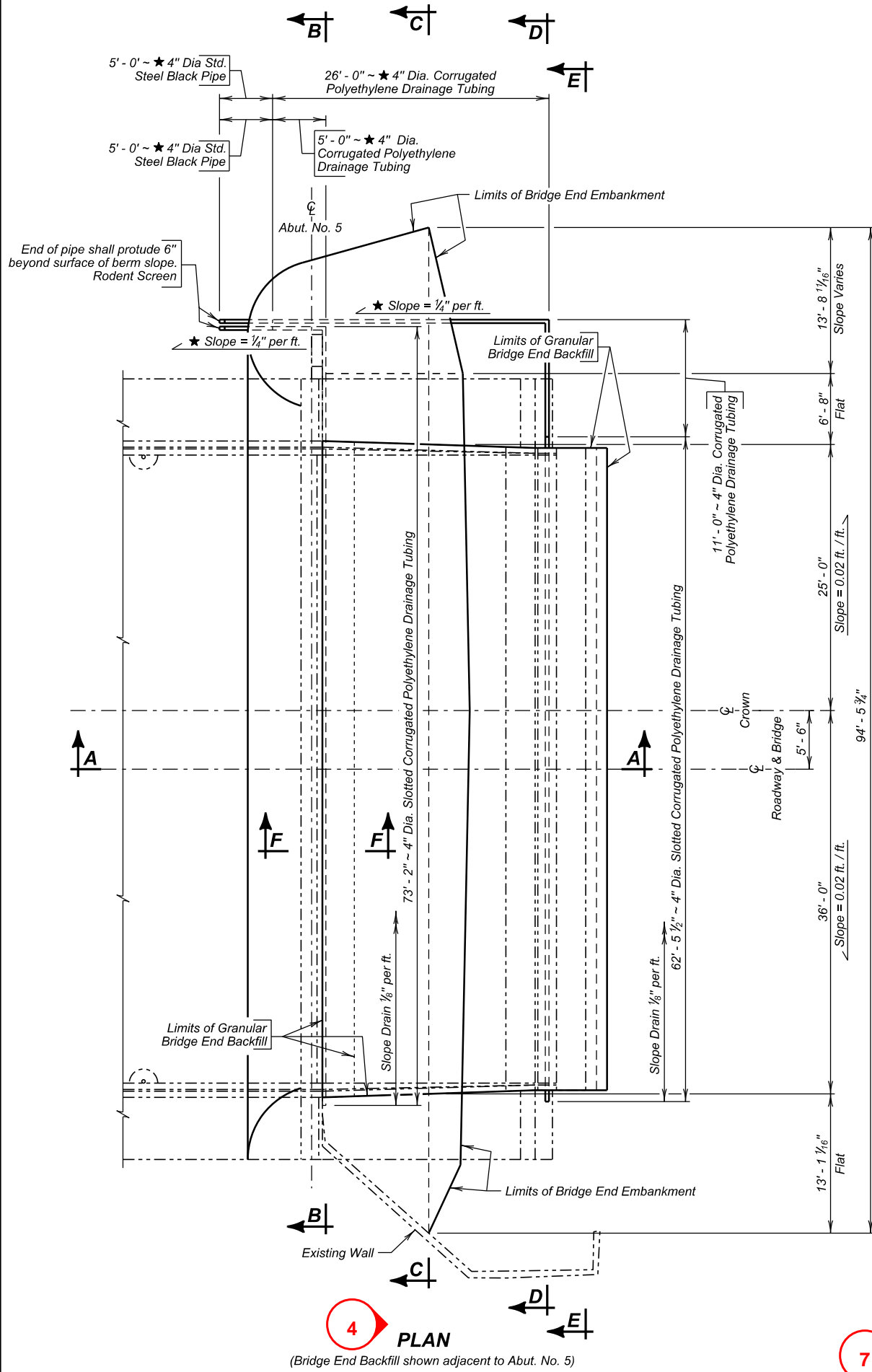


1 DETAILS OF BRIDGE END BACKFILL ADJACENT TO ABUTMENT NO. 1 (B)

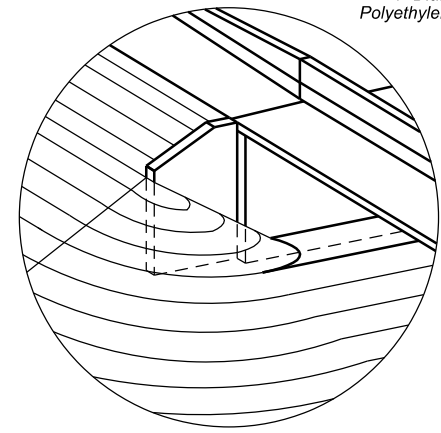
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

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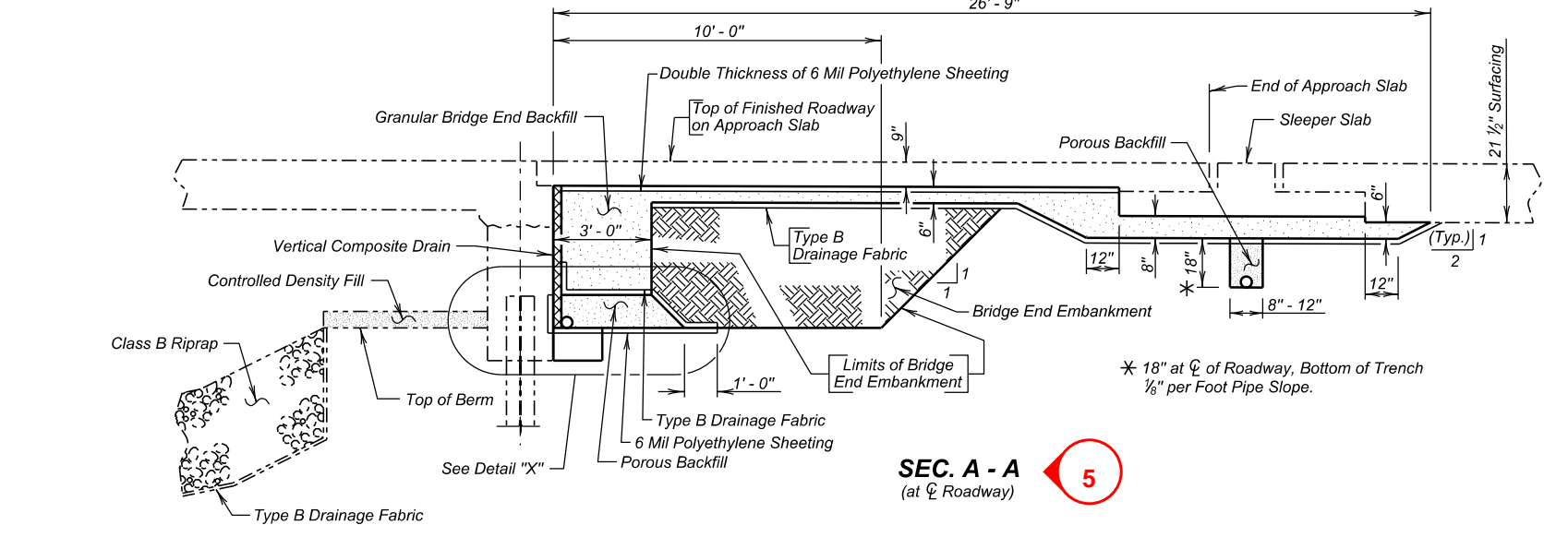
DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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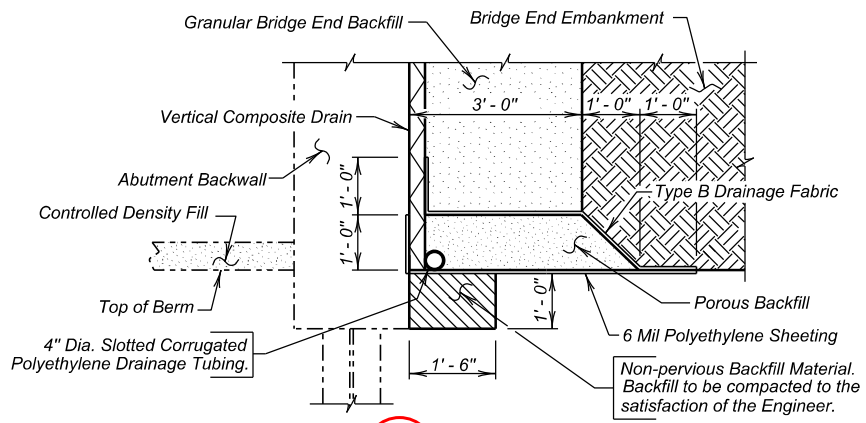
4 PLAN
(Bridge End Backfill shown adjacent to Abut. No. 5)



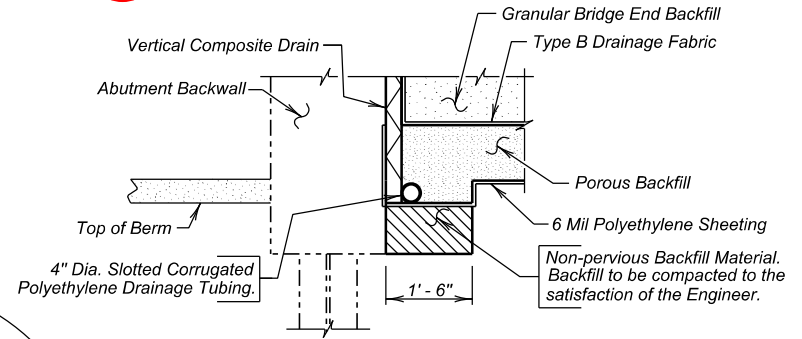
7 SPILL CONE DETAIL AT EMBANKMENT
(Pipes and Railing not shown)



5 SEC. A - A
(at centerline of Roadway)



8 DETAIL "X"



6 SEC. F - F

REQUIRED LIST	
1 Title Block	5 Section A - A
2 Project Block	6 Section F - F
3 Estimated Quantities	7 Spill Cone Detail
4 Plan View	8 Detail "X"

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Granular Bridge End Backfill	Cu. Yd.	56.9
Bridge End Embankment	Cu. Yd.	171
Porous Backfill	Ton	24.5
4" Underdrain Pipe	Ft.	188
Approach Slab Underdrain Excavation	Cu. Yd.	3.0

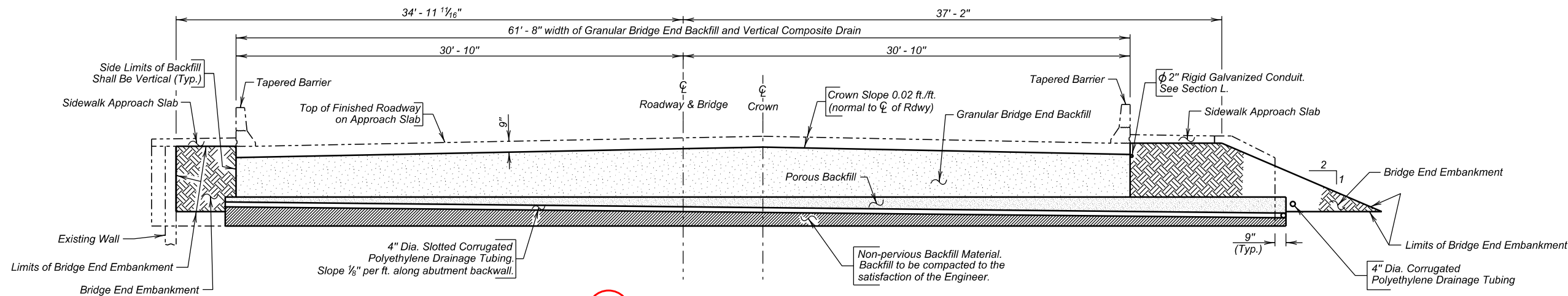
- 136 ft. 4" dia. Slotted Corrugated Polyethylene Drainage Tubing.
 - 42 ft. 4" dia. Corrugated Polyethylene Drainage Tubing.
 - 10 ft. 4" dia. Std. Black Steel Pipe with Rodent Screens.
 - 255 sq. ft. Vertical Composite Drain
- Items 1 thru 4 are approximate quantities contained in the 4" Underdrain Pipe and are for information only.
- 2546 sq. ft. 6 mil Polyethylene Sheeting, not including laps.
 - 216 sq. yd. Type B Drainage Fabric.
- Items 5 and 6 are approximate quantities contained in the Granular Bridge End Backfill and are for information only.
- For estimating purposes only, a factor of 1.89 tons/cu. yd. was used to convert cu. yds. to tons.
- Shrinkage Factor of 1.25 Used.
- Quantity based on a 12" wide trench.

1 DETAILS OF BRIDGE END BACKFILL
ADJACENT TO ABUTMENT NO. 5 (A)
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

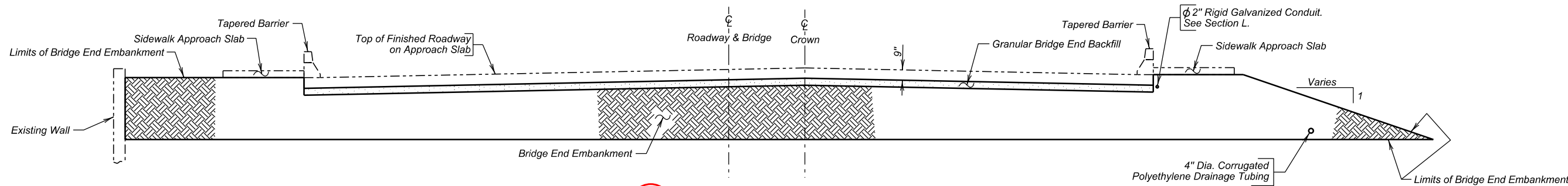
NOTE:
ø Conduit to be installed with bridge end backfill. See Section L.

2

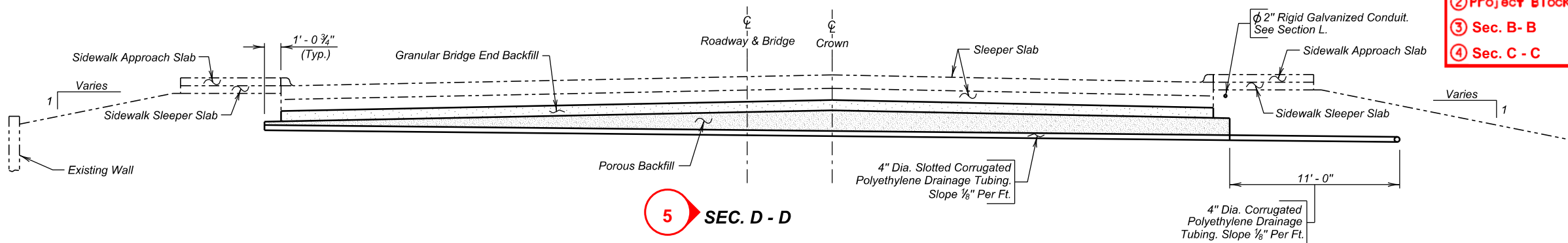
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			



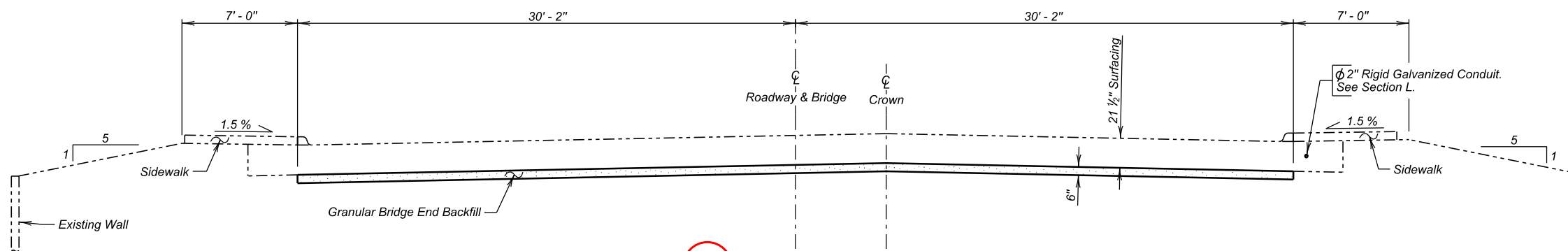
3 SEC. B - B



4 SEC. C - C



5 SEC. D - D



6 SEC. E - E

REQUIRED LIST

- ① Title Block
- ② Project Block
- ③ Sec. B - B
- ④ Sec. C - C
- ⑤ Sec. D - D
- ⑥ Sec. E - E

1 DETAILS OF BRIDGE END BACKFILL ADJACENT TO ABUTMENT NO. 5 (B)

FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017

22 OF 31

DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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REQUIRED LIST

1

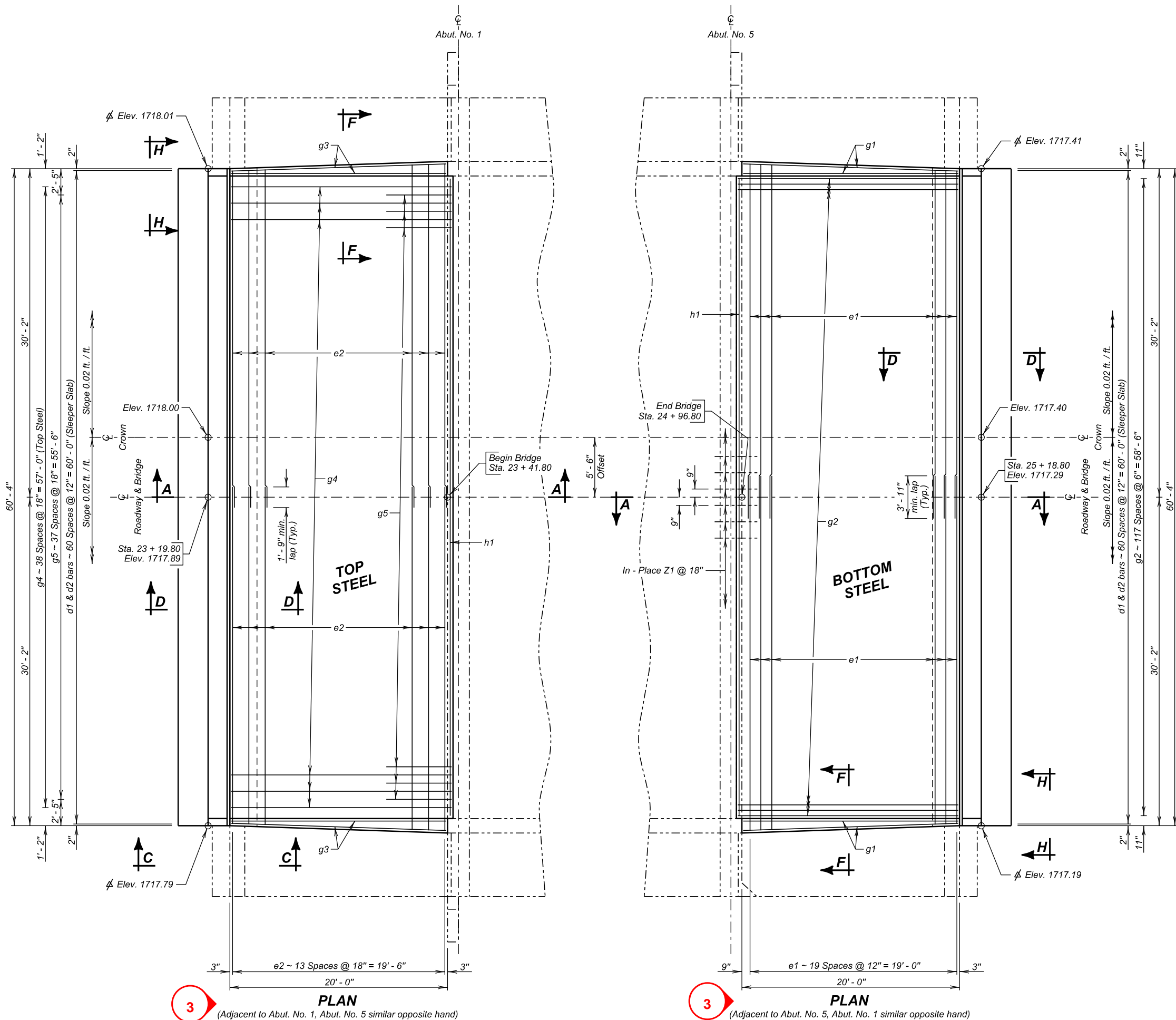
Title Block

2

Project Block

3

Plan Views



1

DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE (A)
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALK 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017

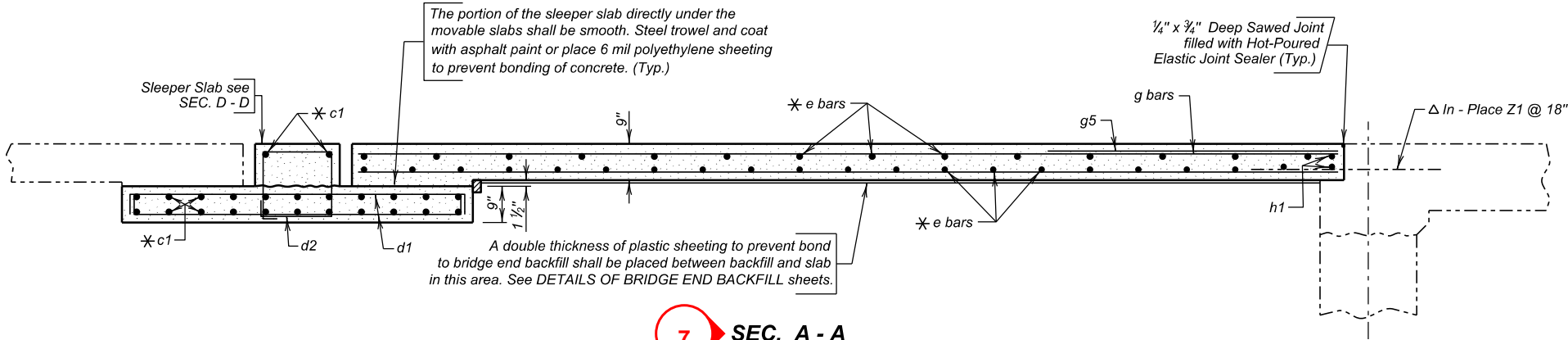
DESIGNED BY PW
CK. DES. BY BB
DRAFTED BY MG
Steve A. Johnson
BRIDGE ENGINEER

23 OF 32

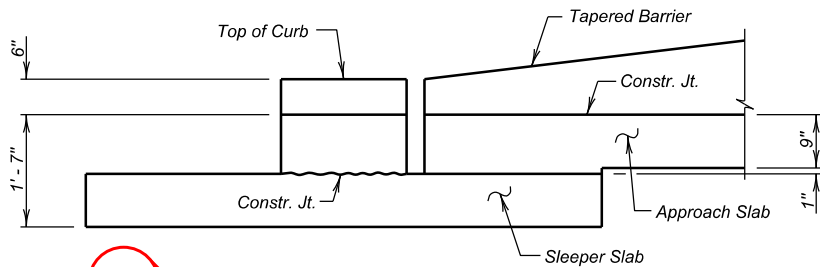
* Min. Lap 2' - 3"

Δ In-place Z1 bars are listed and included in superstructure quantities. See SUPERSTRUCTURE DETAILS sheet.

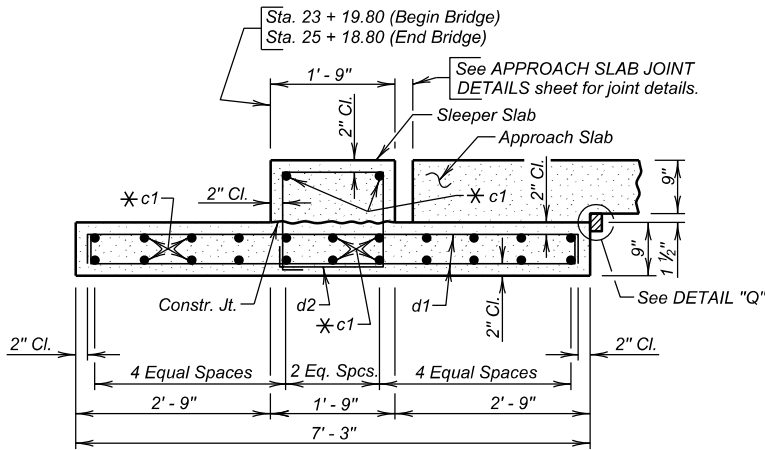
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			



7 SEC. A - A

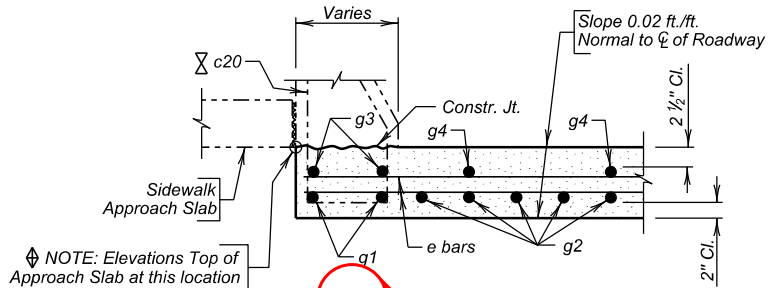


6 VIEW C - C
(Sidewalk Approach & Sleeper Slab not shown)

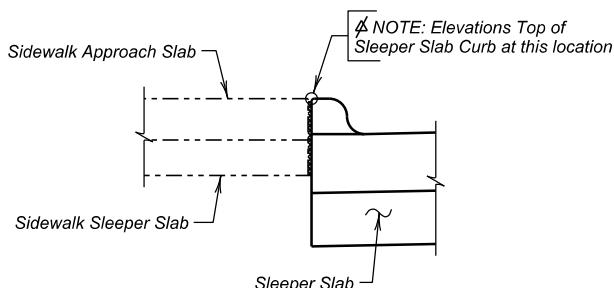


7 SEC. D - D
(Sleeper Slab)

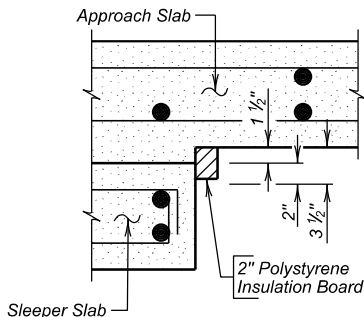
⊗ Shown and included in reinforcing schedule for tapered barriers. See TAPERED BARRIER DETAILS (B) sheet for details.



7 SEC. F - F



6 VIEW H - H

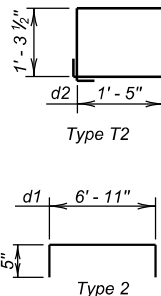


DETAIL "Q"

REINFORCING SCHEDULE

(For Two Approach Slabs & Two Sleeper Slabs)

Mk.	No.	Size	Length	Type
Sleeper Slabs				
c1	96	5	31' - 4"	Str.
d1	244	4	7' - 9"	2
d2	122	4	6' - 2"	T2
Approach Slabs				
e1	80	6	32' - 4"	Str.
e2	56	4	31' - 7"	Str.
g1	8	8	19' - 9"	Str.
g2	236	8	20' - 3"	Str.
g3	8	4	19' - 9"	Str.
g4	78	4	20' - 3"	Str.
g5	76	4	6' - 0"	Str.
h1	4	6	58' - 6"	Str.



NOTE:
All bars to be epoxy coated.
All dimensions are out to out of bars.

ESTIMATED QUANTITIES

(For Two Approach Slabs and Two Sleeper Slabs)

ITEM	UNIT	QUANTITY
Concrete Approach Slab for Bridge	Sq. Yd.	277.7
Concrete Approach Sleeper Slab for Bridge	Sq. Yd.	97.3

- 70.8 Cu. Yds. Concrete in Approach Slabs.
- 20065 Lbs. Epoxy Coated Re-Steel in Approach Slabs.
- 31.1 Cu. Yds. Concrete in Sleeper Slabs.
- 4903 Lbs. Epoxy Coated Re-Steel in Sleeper Slabs.
- 30 Sq. Ft. of 2" Polystyrene Insulation Board.
- 3.8 Cu. Yds. Concrete in Tapered Barriers.
- 1072 Lbs. Epoxy Coated Re-Steel in Tapered Barriers.

Items 1 thru 7 are approximate quantities contained in the above bid items and are for information only.

REQUIRED LIST

- Title Block
- Project Block
- Reinforcing Schedule
- Estimated Quantities
- Details as Required
- Views as Required
- Sections as Required

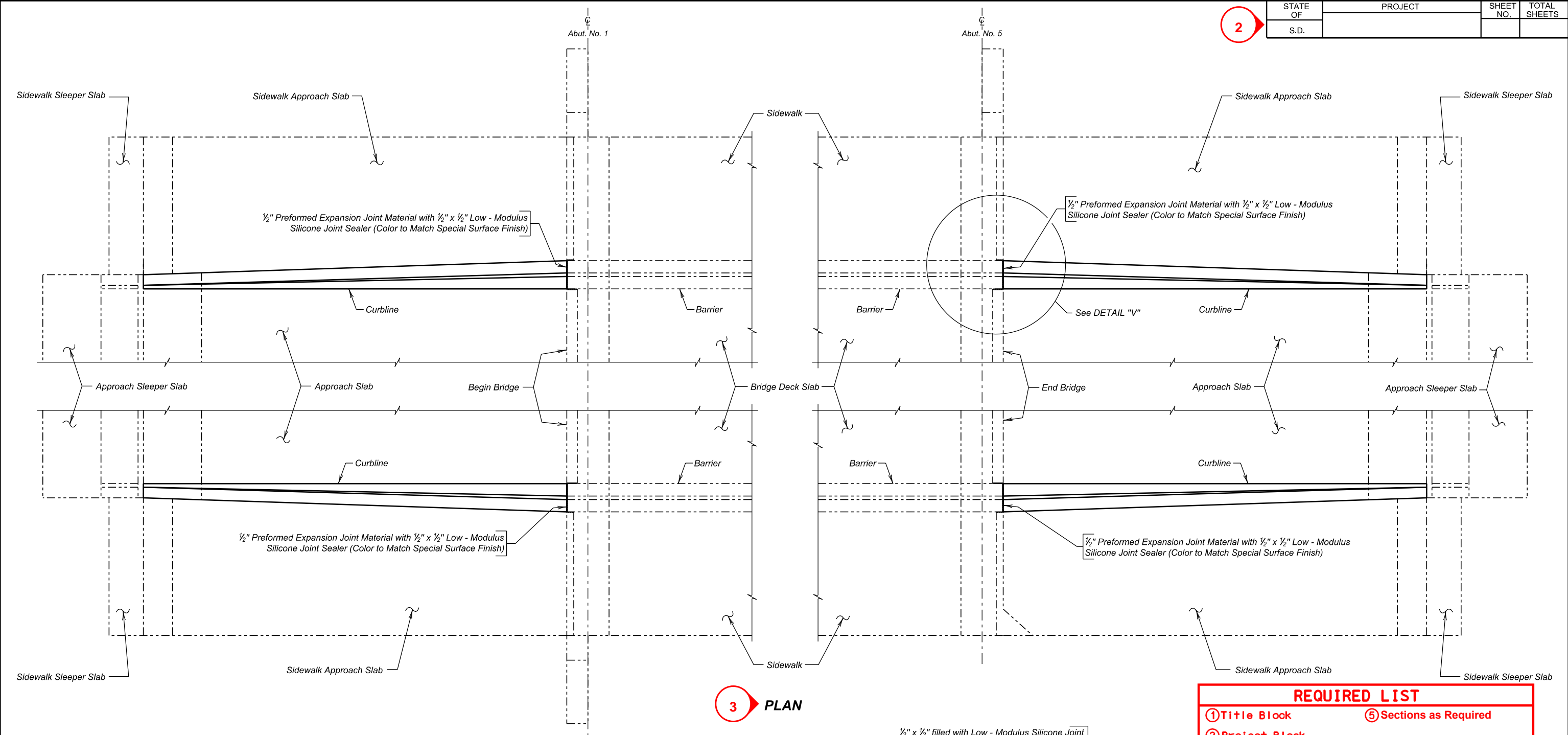
DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE (B)

FOR
155' - 0" CONT. CONCRETE BRIDGE

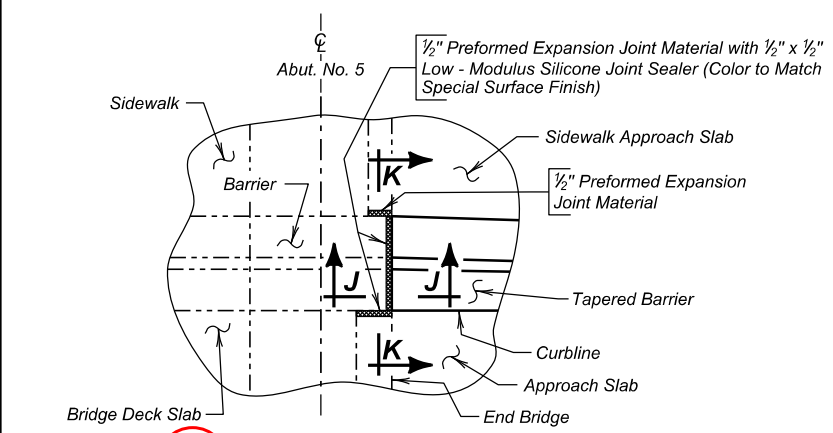
59' - 0" ROADWAY & 5' - 0" SIDEWALK
OVER BIG SIOUX RIVER
STA. 23 + 41.80 TO 24 + 96.80
STR. NO. 15-181-180

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017

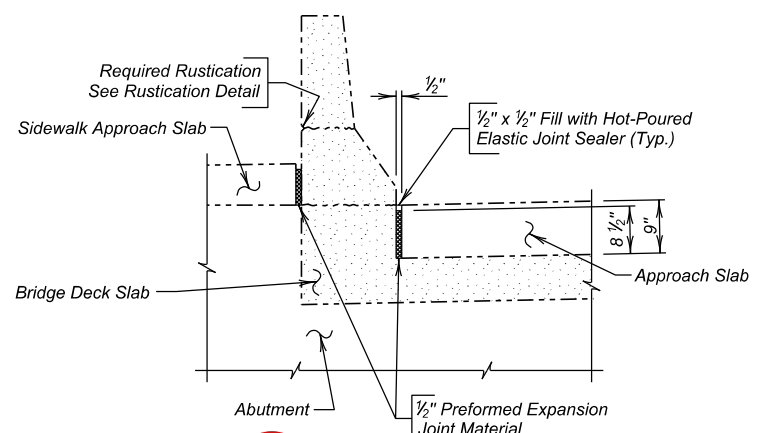
DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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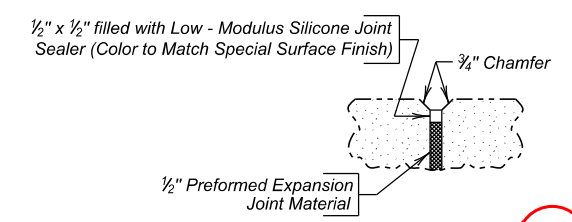
3 PLAN



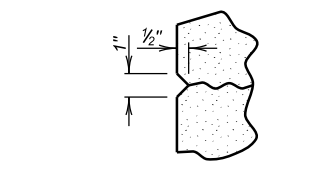
4 DETAIL "V"
(End Bridge shown, Begin Bridge similar opposite hand)



5 SEC. K - K



5 SEC. J - J



4 RUSTICATION DETAIL

- REQUIRED LIST
- 1 Title Block
 - 2 Project Block
 - 3 Plan View
 - 4 Details as Required
 - 5 Sections as Required

1 TAPERED BARRIER DETAILS (A)
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALK
OVER BIG SIOUX RIVER
STA. 23 + 41.80 TO 24 + 96.80
STR. NO. 15-181-180

0° SKEW
SEC. 31/6-T117/116N-R52W
NH 0212(168)376
HL-93

REQUIRED LIST

1

Title Block

2

Project Block

3

Reinforcing Schedule

4

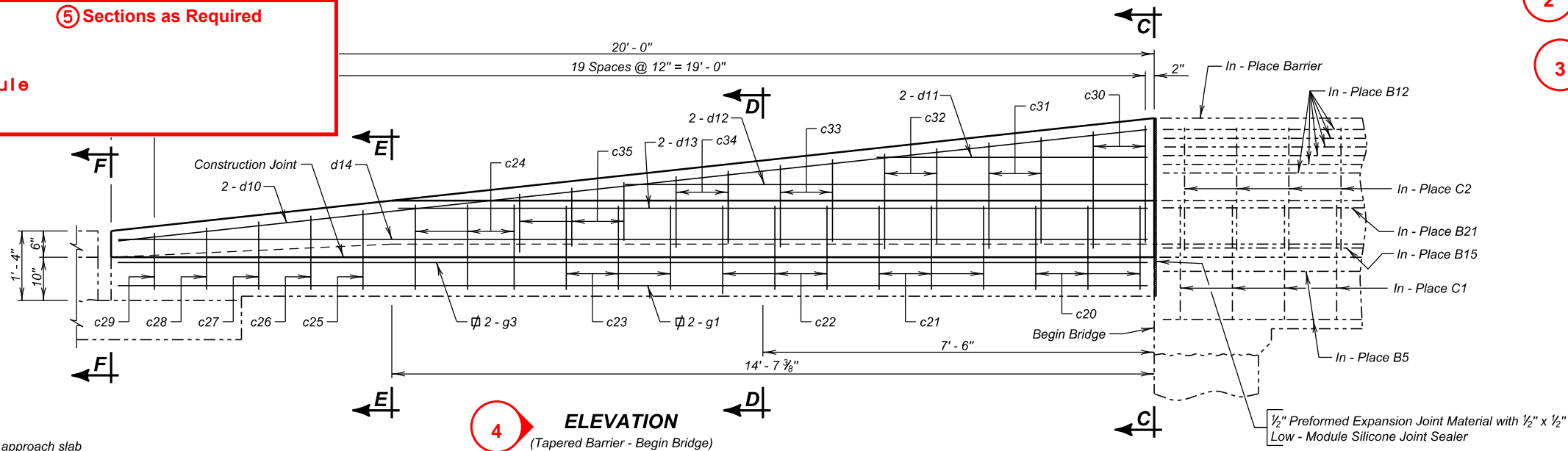
Elevation View

5

Sections as Required

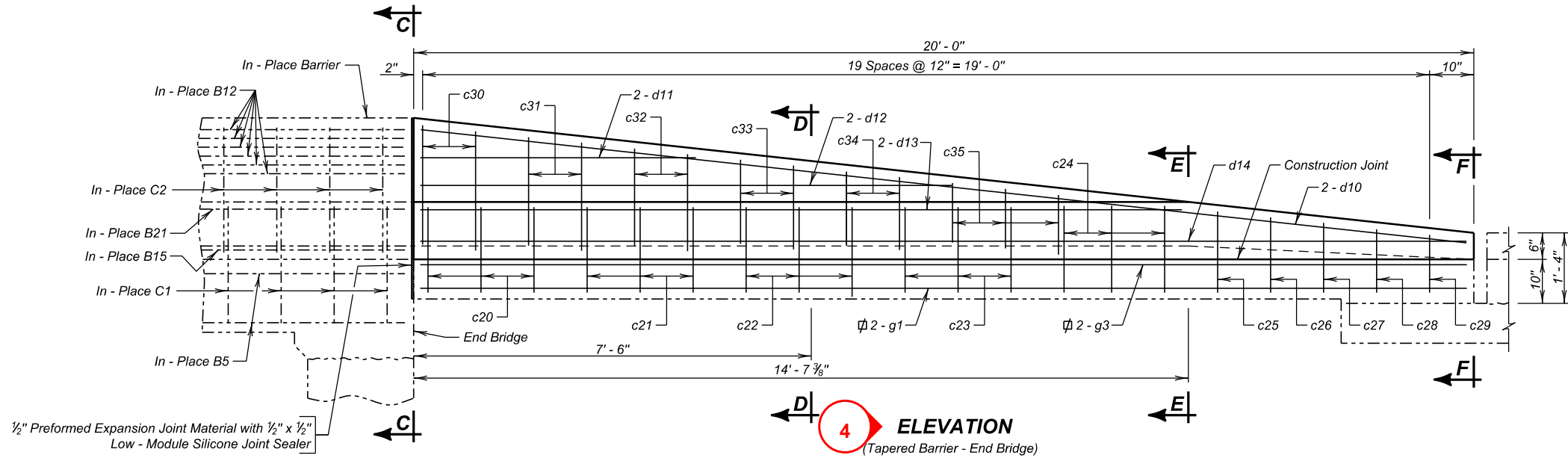
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			

REINFORCING SCHEDULE					
Mk.	No.	Size	Length	Type	Bending Details
4 Tapered Barrier Curbs					
c20	12	5	5' - 8"	T1A	
c21	12	5	5' - 5"	T1A	
c22	12	5	5' - 3"	T1A	
c23	12	5	5' - 1"	T1A	
c24	12	5	4' - 11"	T1A	
c25	4	5	4' - 6"	T7	
c26	4	5	4' - 3"	T7	
c27	4	5	4' - 0"	T7	
c28	4	5	3' - 9"	T7	
c29	4	5	3' - 6"	T7	
c30	8	5	4' - 10"	S11	
c31	8	5	4' - 5"	S11	
c32	8	5	4' - 0"	S11	
c33	8	5	3' - 6"	S11	
c34	8	5	3' - 1"	S11	
c35	12	5	2' - 7"	S11	
d10	8	5	19' - 9"	Str.	
d11	8	5	4' - 9"	Str.	
d12	8	5	9' - 9"	Str.	
d13	8	5	14' - 6"	Str.	
d14	4	4	19' - 8"	Str.	



4 ELEVATION
(Tapered Barrier - Begin Bridge)

∅ Shown and included in approach slab quantities. See APPROACH SLAB ADJACENT TO BRIDGE DETAILS (B) sheet for details.



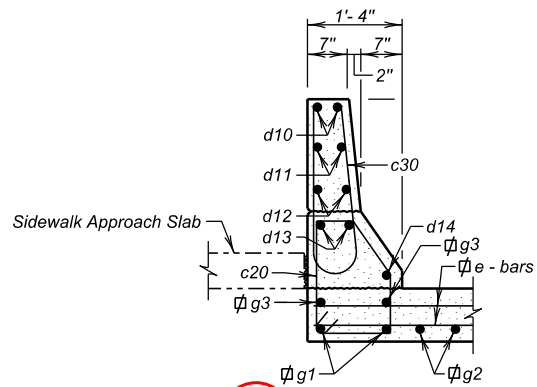
4 ELEVATION
(Tapered Barrier - End Bridge)

NOTE:
For listing re-bar and concrete quantities see DETAILS OF APPROACH SLAB ADJACENT TO BRIDGE (B) sheet for details.

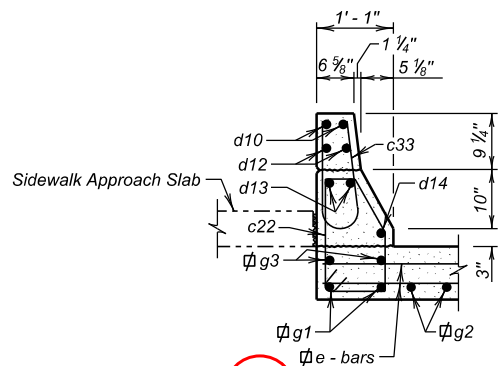
NOTES:
All dimensions are out to out of bars.
All bars to be Epoxy Coated.

1 TAPERED BARRIER DETAILS (B)
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALK
OVER BIG SIOUX RIVER
STA. 23 + 41.80 TO 24 + 96.80
STR. NO. 15-181-180
0° SKEW
SEC. 31/6-T117/116N-R52W
NH 0212(168)376
HL-93

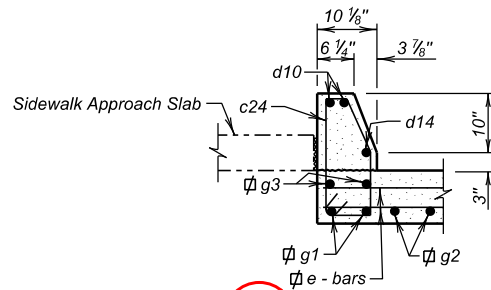
CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017



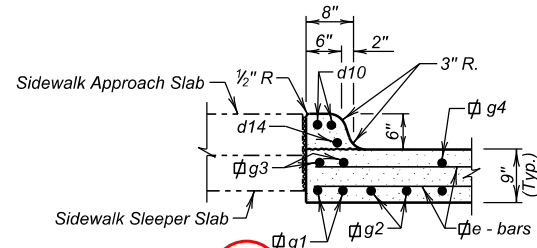
5 SEC. C - C



5 SEC. D - D

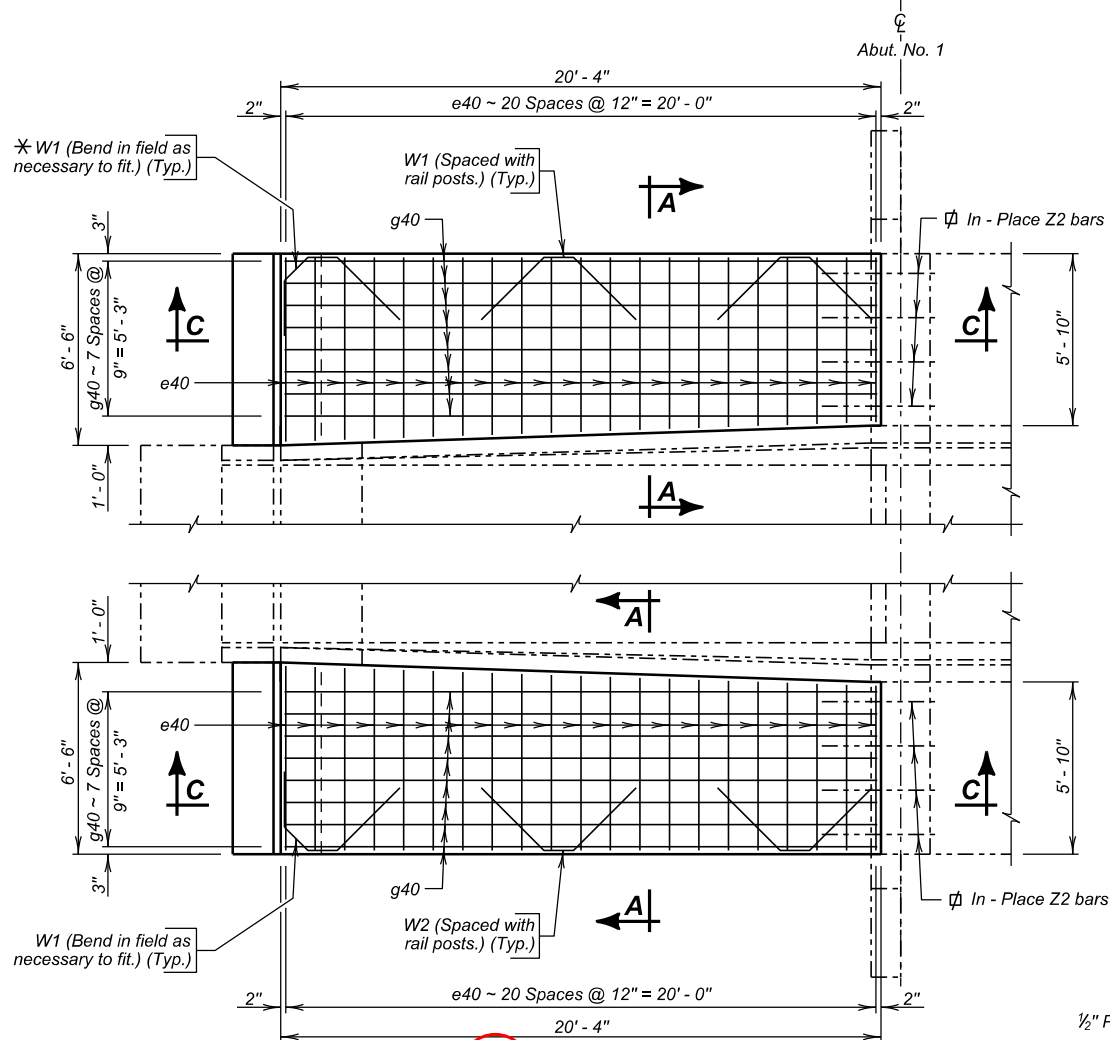


5 SEC. E - E

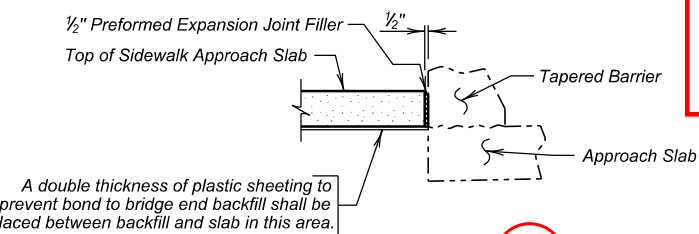


5 SEC. F - F

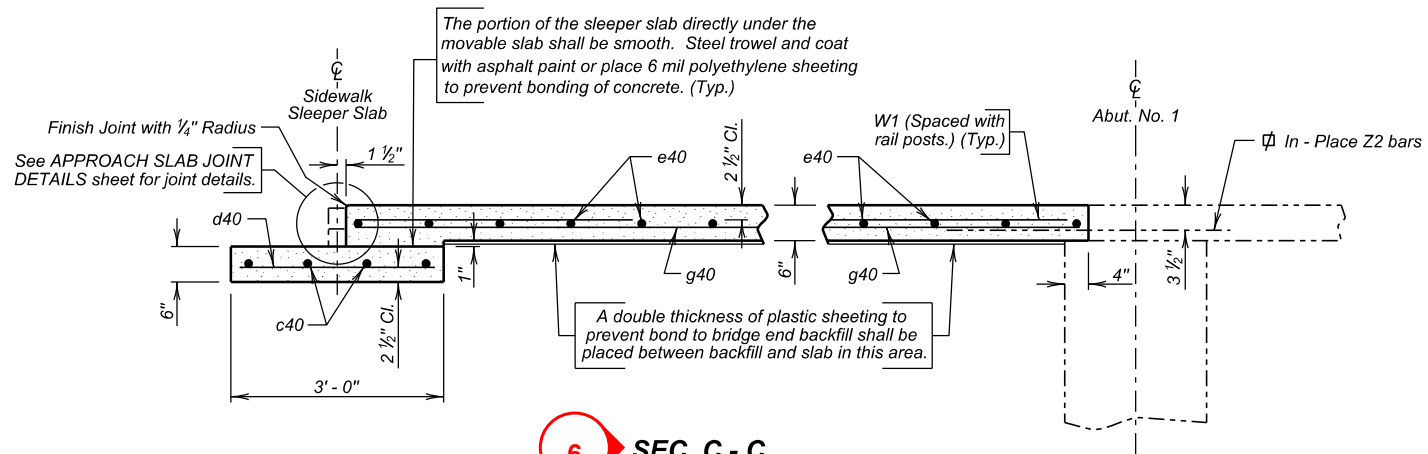
Ø In-place Z2 bars are listed and included in superstructure quantities.
See SUPERSTRUCTURE DETAILS sheet for details.



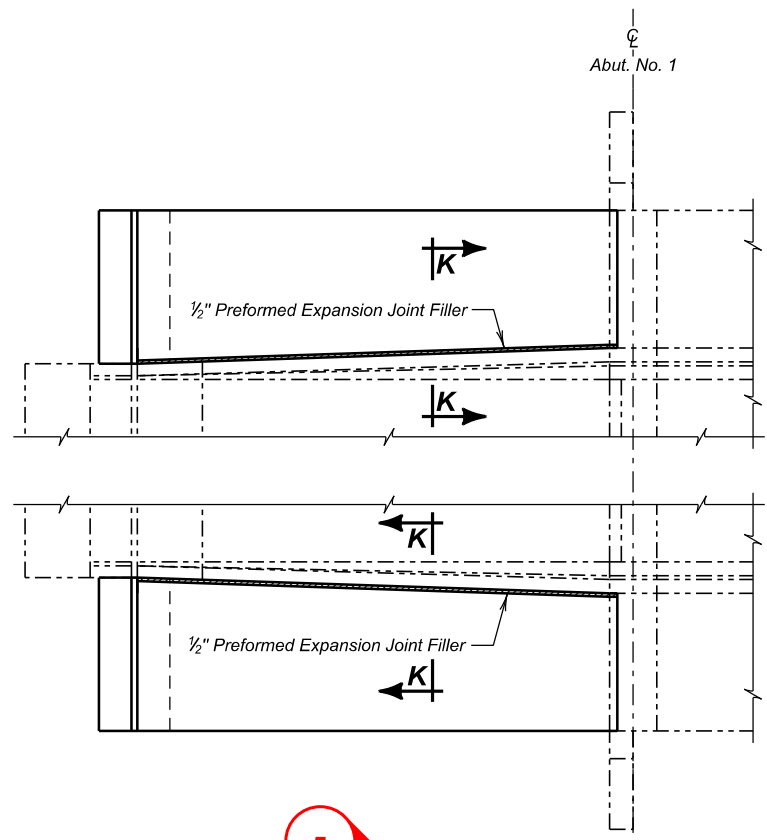
5 PLAN
(Sidewalk Approach Slabs shown adjacent to Abut. No. 1, Abut. No. 5 similar opposite hand)



6 SEC. K - K

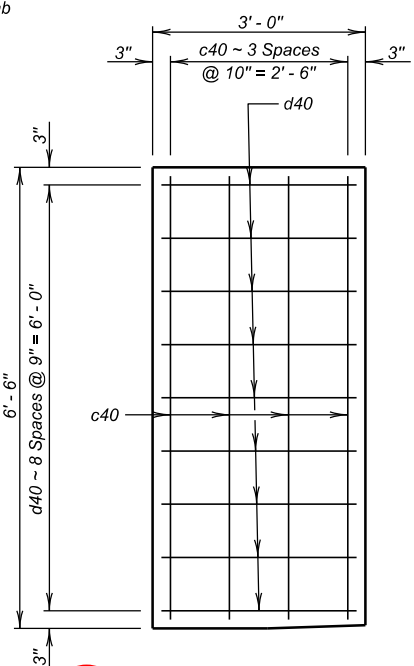


6 SEC. C - C



5 PLAN
(Expansion Joint Filler shown adjacent to Abut. No. 1, Abut. No. 5 similar opposite hand)

- REQUIRED LIST**
- 1 Title Block
 - 2 Project Block
 - 3 Reinforcing Schedule
 - 4 Estimated Quantities
 - 5 Plan View
 - 6 Sections as Required



5 PLAN
(Sidewalk Sleeper Slab shown adjacent to Abut. No. 1)

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			

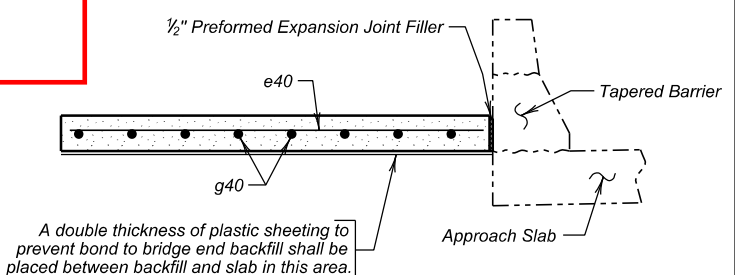
REINFORCING SCHEDULE				
(For Four Sidewalk Approach Slabs and Four Sidewalk Sleeper Slabs)				
Mk.	No.	Size	Length	Type
c40	16	4	6' - 3"	Str.
d40	36	4	2' - 9"	Str.
e40	42	4	11' - 10"	Str.
g40	32	4	20' - 0"	Str.
W1	12	4	7' - 0"	17B

NOTE:
All bars to be Epoxy Coated.
All dimensions are out to out of bars.
See cutting diagram.
Bend in field as necessary to fit.

ESTIMATED QUANTITIES		
(For Four Sidewalk Approach Slabs)		
ITEM	UNIT	QUANTITY
6" Reinforced Concrete Sidewalk	Sq. Ft.	544

- 9.4 Cu. Yds. Concrete in Sidewalk Approach Slabs.
- 817 Lbs. Epoxy Coated Re-Steel in Sidewalk Approach Slabs.
- 1.4 Cu. Yds. Concrete in Sidewalk Sleeper Slabs.
- 133 Lbs. Epoxy Coated Re-Steel in Sidewalk Sleeper Slabs.
- 915 Sq. Ft. 6 mil Polyethylene sheeting under reinf. conc. sidewalk.
- 82 Ft. of Expansion Joint adjacent to tapered barrier.

Items 1 thru 6 are approximate quantities contained in the above bid item and are for information only.



6 SEC. A - A

1 SIDEWALK APPROACH SLAB DETAILS
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS
OVER BIG SIOUX RIVER
STA. 23 + 41.80 TO 24 + 96.80
STR. NO. 15-181-180

0° SKEW
SEC. 31/6-T117/116N-R52W
NH 0212(168)376
HL-93

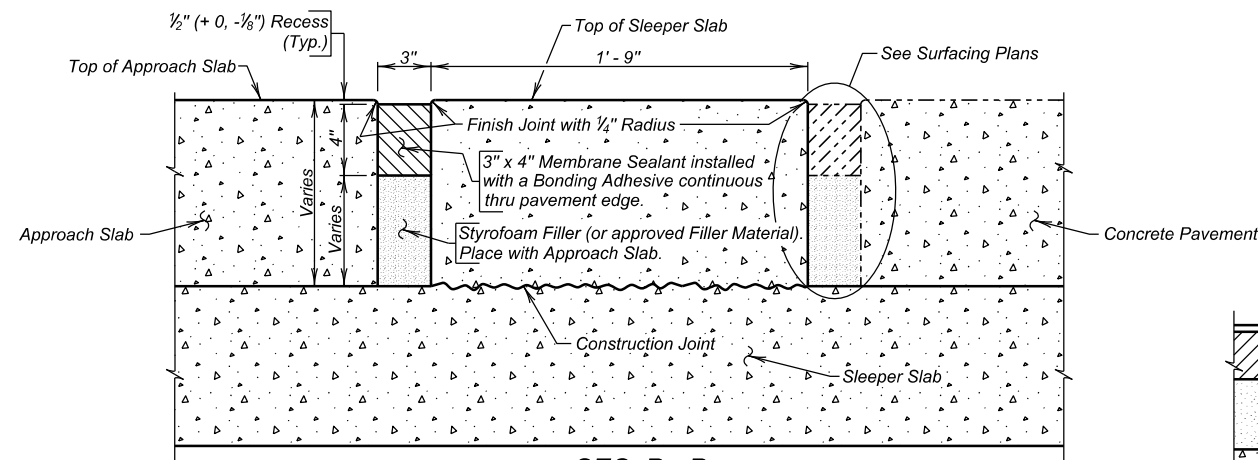


- ① Title Block ③ Fill out Remainder of Standard Base Sheet
- ② Project Block

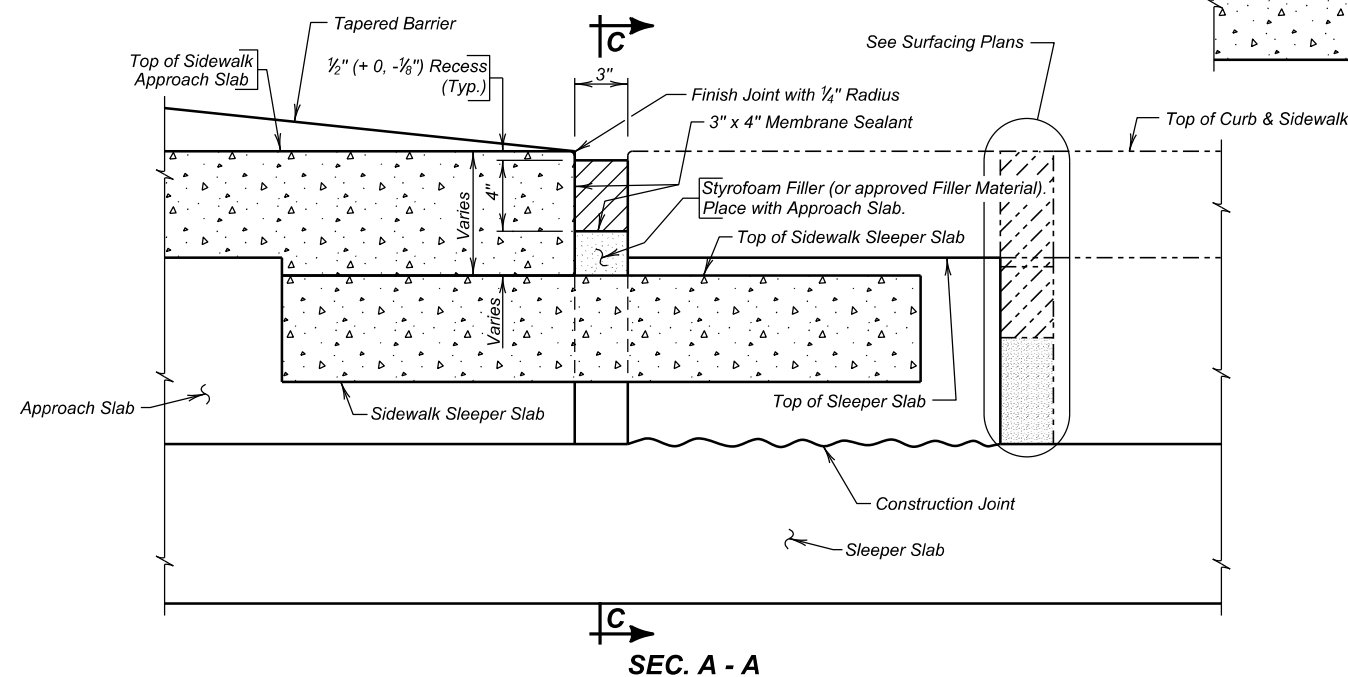
GENERAL NOTES

1. The Membrane Sealant shall be on the approved product list for Membrane Sealant Expansion Joints.
2. The manufacturer shall supply the membrane sealant in packaging that precompresses the membrane sealant. The precompressed dimension shall be as recommended by the sealant manufacturer, however, in no case shall the precompressed dimension exceed 75% of the joint opening width. The foam sealant shall be slowly self expanding to permit workers ample time to install the membrane sealant before the membrane sealant exceeds the joint opening width.
3. The membrane sealant shall provide a water tight seal throughout a joint movement range of + 25% (minimum) from the specified joint opening dimension.
4. The membrane sealant shall be supplied in pieces a minimum of 5 feet in length. The foam sealant shall be ultra-violet and ozone resistant.
5. The bonding adhesive used to attach the membrane sealant to the adjacent concrete shall be approved by the membrane sealant manufacturer.
6. Adhesive used to join adjacent pieces of the membrane sealant shall be as recommended by the manufacturer.
7. If styrofoam filler material is used in the construction, it shall be closed cell and water-tight as approved by the Engineer.
8. The minimum ambient air temperature at the time of joint installation and adhesive curing shall be 40° F.
9. A technical representative of the membrane sealant manufacturer shall be present at the jobsite during installation. The technical representative shall be knowledgeable in the correct procedures for the preparation and installation of the joint material to ensure the Contractor installs the joint to the manufacturers' recommendations.
10. Surfaces that will be in contact with the membrane sealant shall be thoroughly cleaned by abrasive blasting to remove all laitance and contaminants (such as oil, curing compounds, etc.) from the surface. At a minimum, two passes of abrasive blasting with the nozzle held at an angle to within 1 to 2 inches of the surface will be required. Cleaning of the surfaces with solvents, wire brushing, or grinding shall not be permitted.
11. After abrasive blasting, but immediately prior to membrane joint installation, the entire joint contact surface shall be air blasted. The air compressor used for joint cleaning shall be equipped with trap devices capable of providing moisture-free and oil-free air at a recommended pressure of 90 psi. To obtain complete bonding with the adhesive, the adjacent surfaces must be dry and clean. The contact surfaces for the joint shall be visually inspected by the Engineer immediately prior to joint installation to verify the surface is dry and clean.
12. Individual spliced sections shall be installed as per the manufacturers' recommendations. The membrane joint sealant manufacturer shall submit a detailed installation procedure to the Engineer at least 5 days prior to joint installation for his review.
13. Traffic shall not be allowed on the joint until the bonding adhesive has had time to cure, as recommended by the manufacturer.
14. Use plywood or other material to protect concrete adjacent to the joint from spalling before any equipment is moved across the joint. Any spall areas will be repaired at the Contractor's expense by breaking out and replacing adjacent concrete, as approved by the Engineer.
15. The Membrane Sealant Expansion Joint will be measured in feet to the nearest one-tenth foot, complete in place. Measurement will be made of the overall horizontal length. The Membrane Sealant Expansion Joint will be paid for at the contract unit price per foot complete in place. Payment for this item shall be full compensation for furnishing all the required materials in place, including labor, equipment and incidentals necessary to complete the work in accordance with the plans and the foregoing specifications.

PLAN



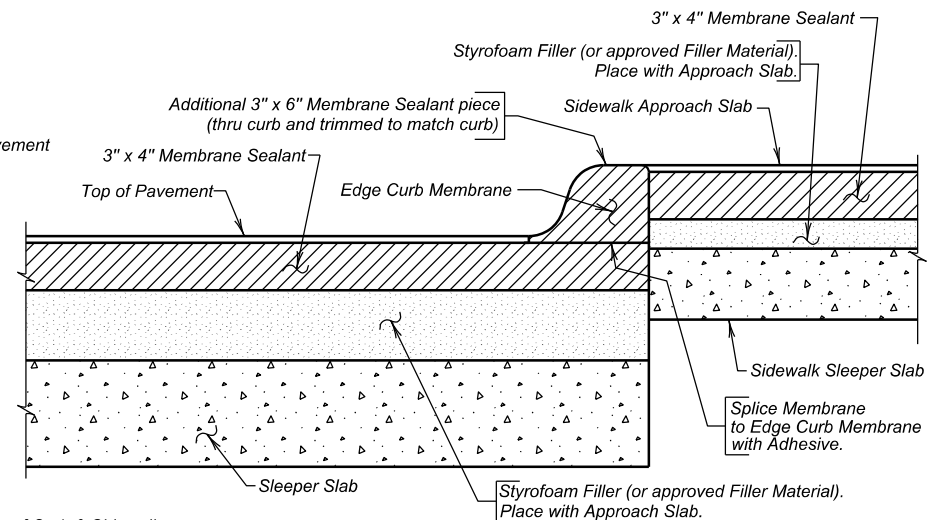
SEC. B - B



ESTIMATED QUANTITIES

(For Two Approach Slabs)

ITEM	UNIT	QUANTITY
Membrane Sealant Expansion Joint	Ft.	146.7



SEC. C - C

1 APPROACH SLAB JOINT DETAILS

FOR

155' - 0" CONT. CONCRETE BRIDGE

59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

CODINGTON COUNTY

S. D. DEPT. OF TRANSPORTATION

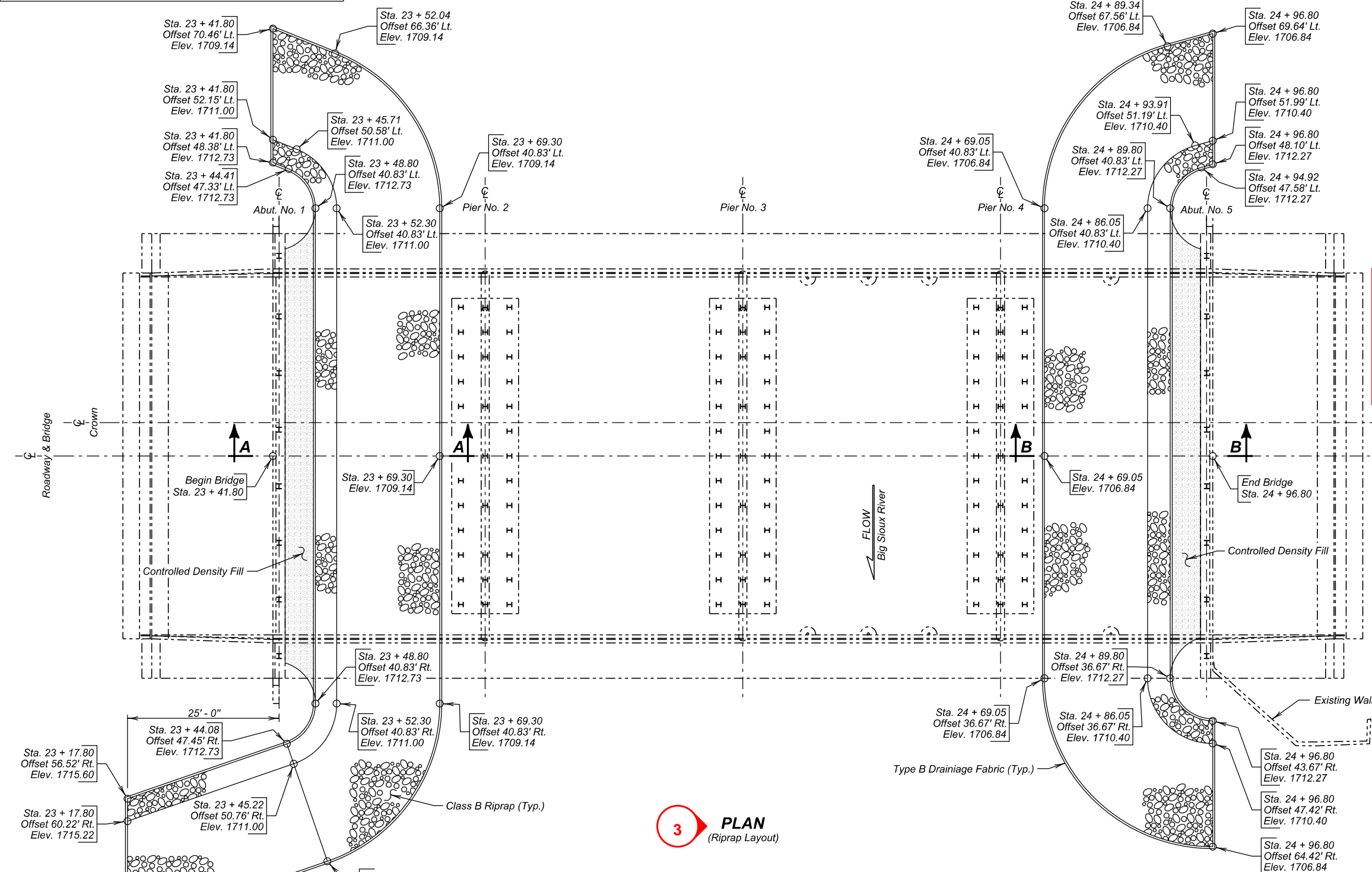
SEPTEMBER 2017

(28) OF (31)

DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY MG	<i>Steve A Johnson</i> BRIDGE ENGINEER
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The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			



3 PLAN
(Riprap Layout)

REQUIRED LIST	
1 Title Block	5 Sections as Required
2 Project Block	6 North Arrow
3 Plan View	
4 Estimated Quantities	

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Class B Riprap	Ton	970.1
Type B Drainage Fabric	Sq. Yd.	928
Controlled Density Fill	Cu. Yd.	12.9

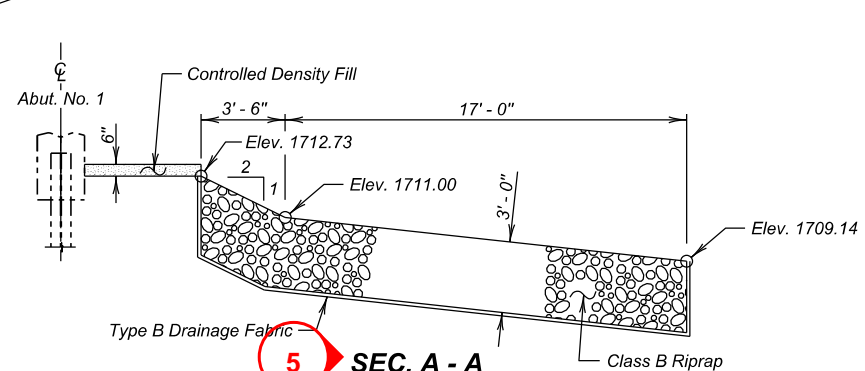
* For estimating purposes only, a factor of 1.4 tons/cu.yd. was used to convert Cu. Yds. to Tons.

1 RIPRAP DETAILS

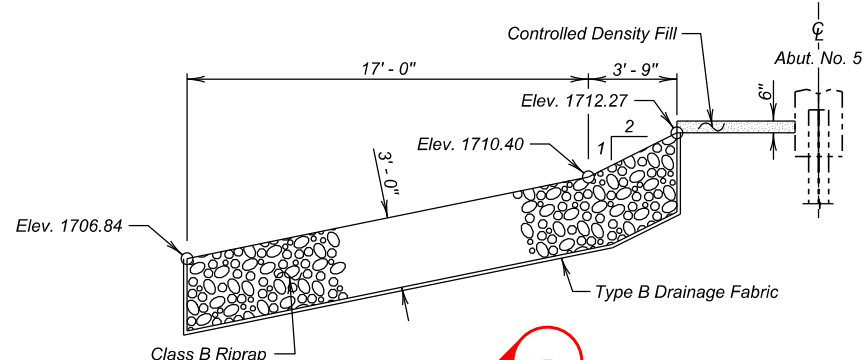
FOR
155' - 0" CONT. CONCRETE BRIDGE
59' - 0" ROADWAY & 5' - 0" SIDEWALKS 0° SKEW
OVER BIG SIOUX RIVER SEC. 31/6-T117/116N-R52W
STA. 23 + 41.80 TO 24 + 96.80 NH 0212(168)376
STR. NO. 15-181-180 HL-93

CODINGTON COUNTY
S. D. DEPT. OF TRANSPORTATION
SEPTEMBER 2017

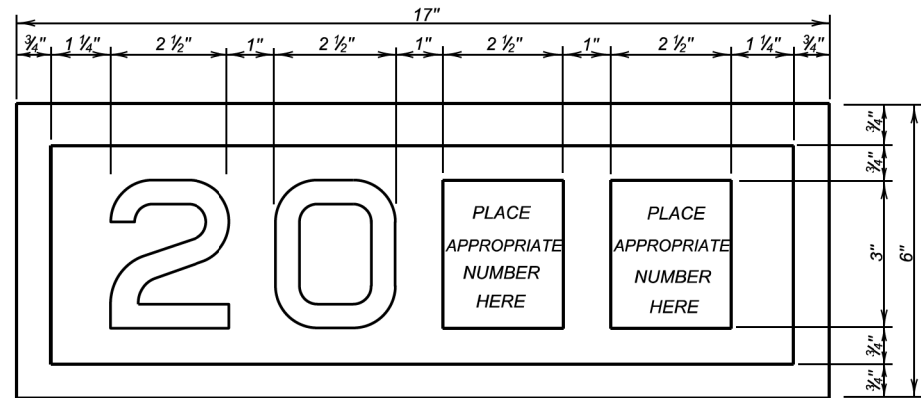
DESIGNED BY PW	CK. DES. BY BB	DRAFTED BY MG	Steve A. Johnson BRIDGE ENGINEER
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5 SEC. A - A



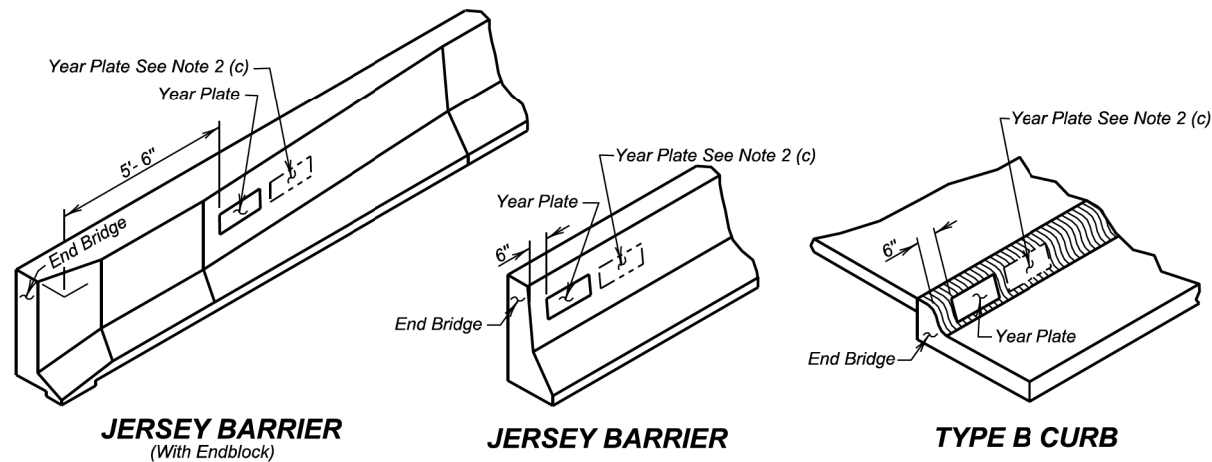
5 SEC. B - B



YEAR PLATE DETAILS

GENERAL NOTES:

- Year plates of the general dimensions shown shall be constructed on all box culverts and bridges. The year plates shall be constructed in reverse and attached to the forms in such a manner that the finished imprint in the concrete does not exceed one-half (1/2) inch in depth.
- Year plates shall be located on structure (s) as follows:
 - On cast-in-place box culverts the year plates shall be four and one-half (4 1/2) inches below the top of the upstream parapet wall and centered laterally on the upstream face. On precast box culverts the year plate shall be centered laterally on the upstream face of the top slab. Where an extended interior wall interferes with this location, the year plate shall be centered in an adjacent barrel.
 - On bridges with six (6) inch curbs or "Jersey" shaped barriers with no endblocks, the year plate shall be centered vertically on the curb face approximately six (6) inches from the end of the bridge, or as designated by the Engineer. On bridges with "Jersey" shaped barrier endblocks, the year plate shall be centered on the upper sloped portion of the barrier approximately 5'-6" from the end of the bridge, or as designated by the Engineer. There shall be one year plate at each end of the bridge on opposite sides.
 - When the plans specify that both the original date of construction and the date of reconstruction are to be shown, one date shall be placed as listed above and the other located adjacent to it. Both year plates shall be shown at each end of the bridge on opposite sides.
- There will be no separate measurement or payment made for year plates on box culverts and bridges. All costs for this work shall be incidental to other contract items.



JERSEY BARRIER
(With Endblock)

JERSEY BARRIER

TYPE B CURB

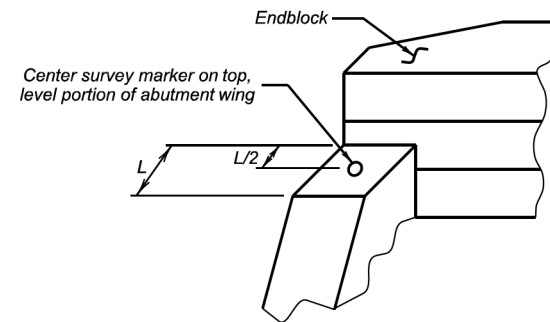
June 26, 2012

Published Date: 1st Qtr. 2019	S D D O T	YEAR PLATE DETAILS	PLATE NUMBER
			460.02
			Sheet 1 of 1

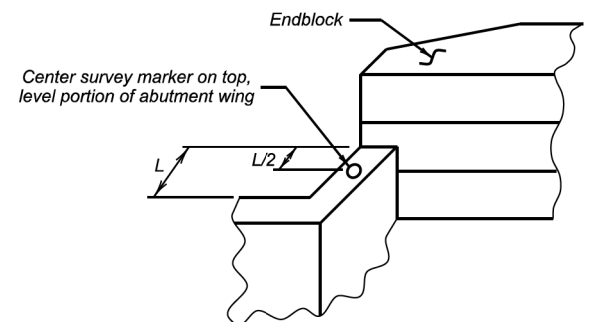
REQUIRED LIST

- Title Block
- Project Block
- Insert Required Standard Plate Sheets as Needed

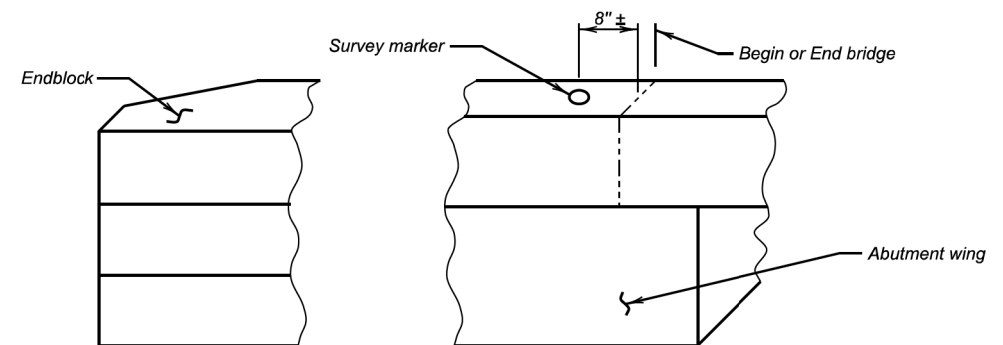
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.			



ABUTMENT WITH
"STRAIGHT" WINGS



ABUTMENT WITH
"SWEEP BACK" WINGS



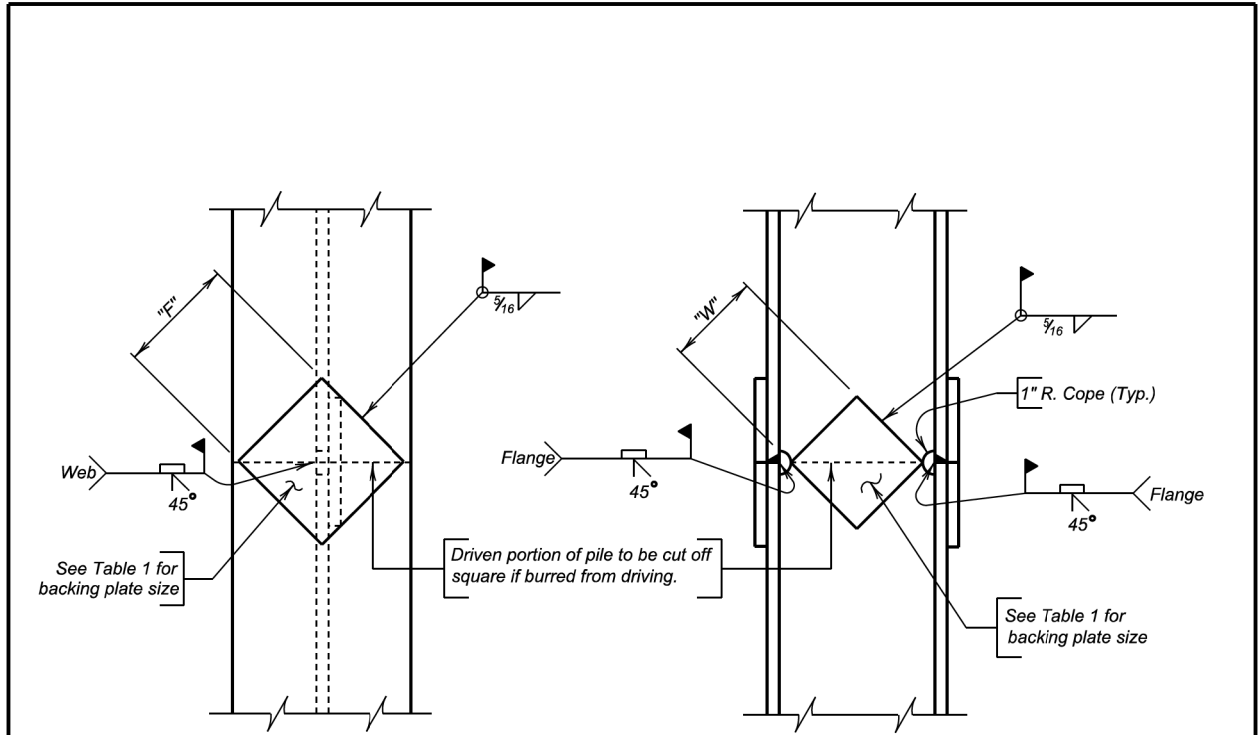
ABUTMENT WITH
"SWEEP BACK" WINGS
(Endblock on top of wings)

GENERAL NOTES:

- Survey markers shall be located at each abutment on the same side of the bridge as the year plate. Place survey markers on abutment wings as shown. Two survey markers will be required at each bridge.
- Survey markers shall be of a type intended for installation in concrete, be made of solid brass or bronze, have a domed top and be either a 3" top diameter (with a 3/4" X 2" long ribbed shank), or a US Army Corps of Engineers Type C Disc with a 3 1/2" top diameter.
- There will be no separate measurement or payment made for survey markers. All costs for this work shall be incidental to the other contract items.

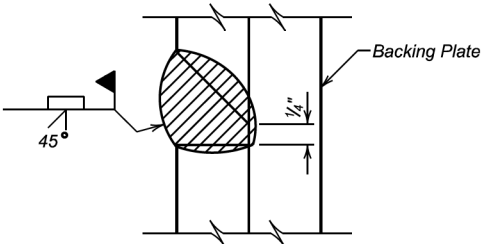
June 26, 2012

Published Date: 1st Qtr. 2019	S D D O T	BRIDGE SURVEY MARKER	PLATE NUMBER
			460.05
			Sheet 1 of 1



NOTE:
Prepare joint surfaces lower end of upper section on the ground and weld on backing plates; then place upper section on lower section and weld.

COMPLETE JOINT PENETRATION WELD DETAIL



GENERAL NOTES:

- Steel for backing plates shall conform to ASTM A709 Grade 50.
- Welding and weld inspection shall be in conformance with AWS D1.5 (Current Year) Bridge Welding Code - Steel.
- Welder must be certified and registered with the SDDOT.
- Backing plate shall at a minimum be as thick as the web of the pile being spliced.
- Web must be coped with 1 inch radius.
- Submit Welding Procedure Specification (WPS) to Bridge Construction Engineer for approval prior to pile driving.

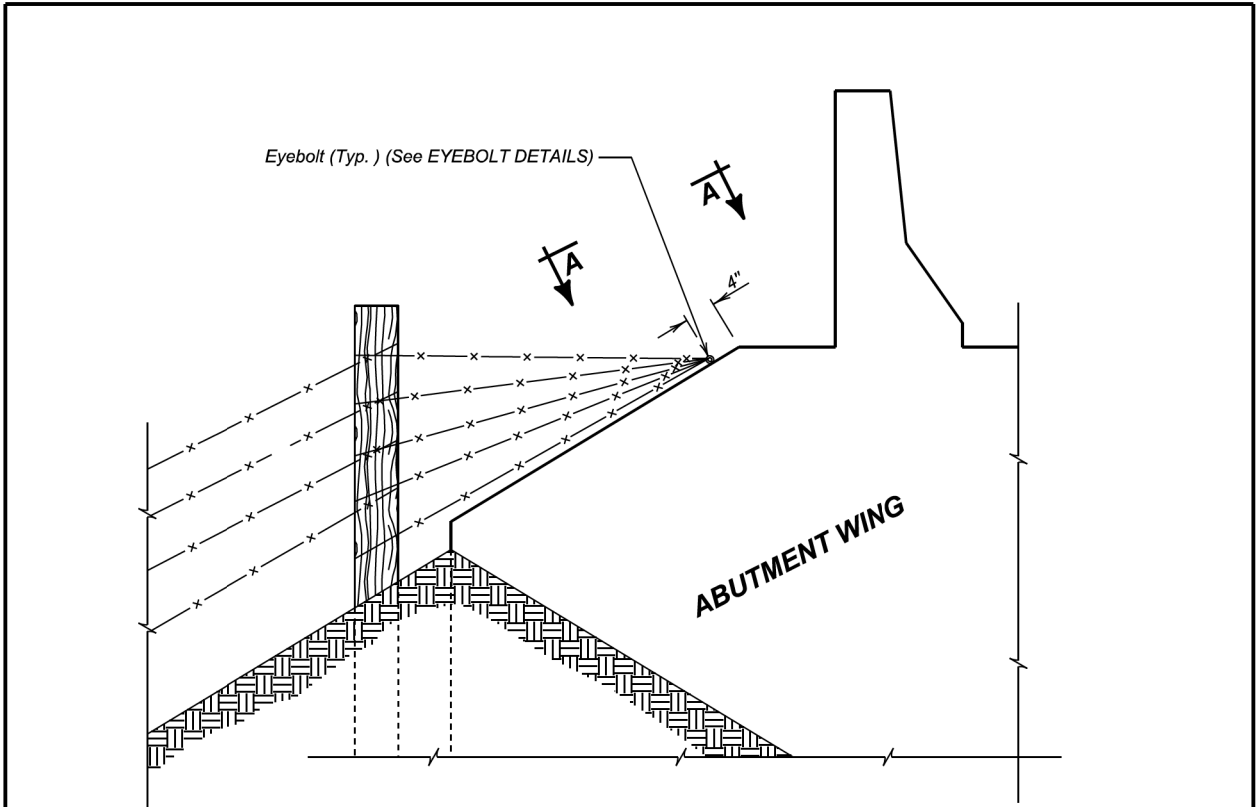
TABLE 1 (BACKING PLATES)			
PILE	10"	12"	14"
"F" FLANGE	6 1/2"	8"	10"
"W" WEB	4 3/4"	6 1/4"	7 1/2"

December 23, 2012

Published Date: 1st Qtr. 2019	S D D O T	STEEL PILE SPLICE DETAILS	PLATE NUMBER 510.40
			Sheet 1 of 1

REQUIRED LIST

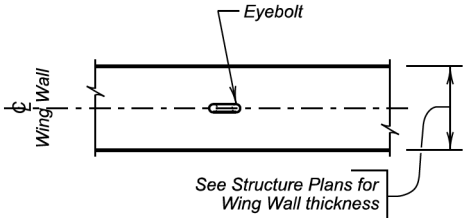
- Title Block
- Project Block
- Insert Required Standard Plate Sheets as Needed



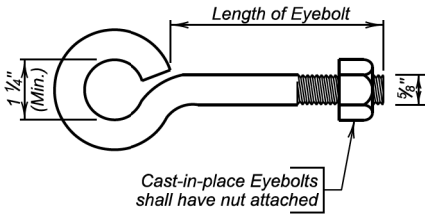
DETAIL FOR FENCE ANCHORS

GENERAL NOTES:

- The fence and post details shown are for illustrative purpose only. The fence shall be as specified elsewhere in the plans.
- Eyebolts shall be placed on all of the bridge abutment wings.
- Eyebolts shall be 5/8 inch diameter and shall conform to ASTM A307.
- Eyebolts, nuts, and concrete inserts shall be galvanized in accordance with AASHTO M232 (ASTM A153). Concrete inserts of corrosion resistant material need not be galvanized.
- Cast-in-place eyebolts shall have a nut attached, be 4 1/2 inches (Min.) in length and shall be embedded such that the eye of the bolt is flush with the concrete surface. (See Eyebolt Details) As an alternate, cast-in-place concrete inserts, capable of developing the full strength of the 5/8 inch diameter threaded eyebolt, may be used and shall be set in the concrete in accordance with the manufacturer's recommendations. The eyebolt shall be of sufficient length to develop its full strength. The eye of the eyebolt shall be flush with the concrete surface.
- The cost for furnishing and installing eyebolts and/or concrete inserts shall be incidental to various contract items.



VIEW A - A



EYEBOLT DETAILS

December 23, 2012

Published Date: 1st Qtr. 2019	S D D O T	FENCE ANCHORS FOR BRIDGE ABUTMENT WINGS (WINGS 6' AND SHORTER)	PLATE NUMBER 620.18
			Sheet 1 of 1